



DISCOURSE OF RATHERS - JORDEN. 1671







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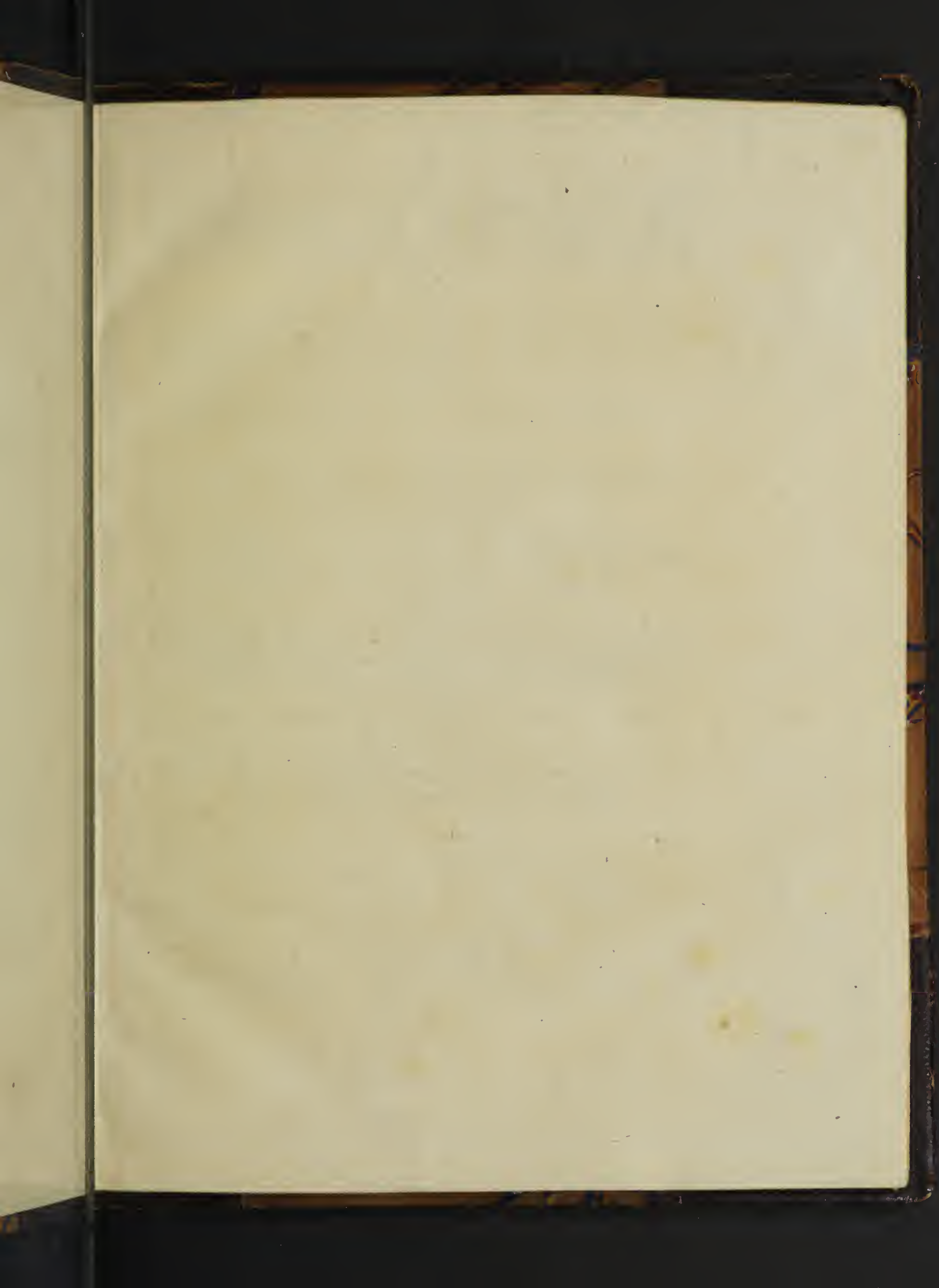
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A
DISCOVERSE
OF
NATVRALL BATHES,
AND
MINERALL WATERS.

Wherein first the originall of Fountaines in
generall is declared.

Then the nature and differences of Minerals, with ex-
amples of particular Bathes from most
of them.

Next the generation of Minerals in the earth, from whence
both the actuall heate of Bathes, and their vertues are
proued to proceede.

*Also by what meanes Minerall Waters are to be examined
and discovered.*

And lastly, of the nature and vses of Bathes, but especi-
ally of our Bathes at *Bathe* in *Sommerseeshire*.

By ED. IORDEN *Dr. in Physicke.*

LONDON:
Printed by THOMAS HARPER.
1631.

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TO THE RIGHT
HONOURABLE, SIR
FRANCIS COTTINGTON, Bar-
ronet, Chancellour of the Exchequer, and
one of his Maiesties most Honourable
Priuy COUNCELL.



He profitable vse of Bathes,
both for necessity and com-
fort, is such, and so well con-
firmed from all antiquity, as I
need not labour to illustrate it
more; onely it hath beene the
ill hap of our Country Bathes to lye more ob-
scure then any other throughout Christen-
dome, although they deserue as well as the
best, because very few haue written any thing
of them, and those haue either not mentioned,
or but slightly passed ouer the maine points
concerning their causes and originals; conten-
ting themselues with an empericall vse of
them. This hath made me through the insti-
gation also of some of my worthy friends, to
attempt somewhat in this kinde: which if it
giue not satisfaction according to my desire,
yet it may be a prouocation to some others, to

The Epistle Dedicatory.

perfect that which I haue begun. And seeing I doe it for the vse of my Country, I haue neglected curious ornaments to garnish it withall, but haue clad it in a plaine suit of our country Cloath, without welt or gard: not desiring it should shew it selfe in forraine parts: *Mea cymba legat littus.*

But in this mine vndertaking, I finde my selfe exposed to many censures, both concerning some paradoxicall opinions in Philosophy, which notwithstanding I deliuer not *gratis*, but confirmed with good grounds of reason and authorities: as also concerning the reformation of our Bathes, which doe daily suffer many indignities more waies then I haue mentioned, vnder the tyranny of ignorance, imposture, priuate respects, wants, factions, disorder, &c. so as they are not able to display their vertues, and doe that good for which God hath sent them to vs: and all for want of such good gouernement as other Bathes doe enioy. I blame not our City herein, vnto whose care the ordering of these Bathes is committed, the disorders and defects being such as are out of their verge, and neither in their power, nor in their knowledge to redresse. For they haue sufficiently testified their
desire

The Epistle Dedicatory.

desire of reforming all such abuses, when they voluntarily did ioyn in petitioning the late King *James* of blessed memory, to that end: by whose death this petition also dyed. And they knew well that it must be superiour power that must effect it. In these respects I haue need of some noble and eminent Patron to protect both me and my Bathes, whose cause I take vpon me to plead, and to aduance, according to their due desert: but especially for the Bathes sake, which I desire may flourish to the utmost extent of benefit to the people; and to haue all impediments remoued out of their way, which may hinder them in the progresse of their vertues. This is the cause Sir, why I presume to dedicate these my labours to your Honour, who hauing obserued in forraigne parts, the vses and gouernements of all sorts, and being both by the fauour of his Maiestie well able, and by your noble disposition well inclined, and willing to maintaine good order and discipline, will, I doubt not, excuse this boldnesse, and pardon my presumption. Consider Sir, that this is your natie Country, which naturally euery man doth affect to aduance; and these Bathes are the principall Iewels of your Country, & able to make it more famous

The Epistle Dedicatory.

then any other parts of this Kingdome, and in aduancing them, to aduance your name to all posterity. Wherefore howsoever my selfe deserue but small respect from you, yet I beseech you respect the Bathes of your Country, and me as a welwisher vnto them.

And as the common opinion of your great worth and abilities, haue moued mee to this boldnesse, so the particular fauours of your Noble Lady, and the encouragement of your learned Physitian, Master Doct^r Baskervill, mine especiall friend, who hath spurred mee on to this worke, haue remoued out of my minde all suspicion of misconstruction. But that as mine intent hath beene meerely the enlarging of the knowledge of those poynts concerning Bathes, and more especially of our Bathes in Sommersetshire; so you will be pleased to accept of this publike inuitation by mee to doe your Country good, and your selfe honour, which I wish may neuer be disioyned. And to mee it will be no small encouragement to deuote my selfe and my best endeauours to your seruice. So I humbly take leaue this 23. Aprilis 1631.

Your Lordships most humble Seruant,

ED. IORDEN.

Libellum istum DE AQUIS MEDICA-
TIS, à Doctissimo IORDANO antiquissi-
mo Collega nostro scriptum multiplici erudi-
tione & novarum subtilitatum varia supellectile re-
fertissimum, legimus, & qui ab omnibus tam Phi-
losophis quam Medicis legatur dignissimum iudi-
cavimus.

IOHANNES ARGENT Collegij Medicorum
Londinensium Præsident.

IOHANNES GIFFORD.

SIMON BASKERVILLE.

THOMAS RIDGELEY.

In laudem operis.

Parue alacri passu liber, Liber, ibis in orbem;
Dentesque spernes liuidos.
Authores pandit, sua dat Iordanus, & usu
Quasita multo protulit.
Aëra qui totus, Flammæ meditatur, & undas,
Terram, metalla discuit.
Quicquid in his veteres, docuit quicquid Novus Author,
Celeri notavit pollice.
At sua dum exponit, lucem dat, operta recludit,
Pennæque fertur liberâ.
Perge liber: gratus gratum volueris in Ennum.
Lympha calentes dum fluent.

Ed. Lapworth, M. D.

In laudem Authoris.

Numine diuino Iordan medicabile flumen
Dicitur, è gelido licet illud frigore constet:
Tu Iordane decus medicorum, candide Doctor,
Lumine diuino gnarus discernere causas
Ægris corporibus nôsti depellere morbos;
Intima seclasa penetrâsti viscera terra,
Thermarum vires aperis, reserasque metalla:
De gremio Telluris aquas manare fluentes
Qua ratione doces, nobis prius abdita pandis
Scrutando Physices arcana indagine mira,
Nec caperis famâ, nec inani laudis amore,
Vt patria prosis, dignarius promere lucem:
Qui memorauerant, vel qui modò Balnea tractant,
Non sunt te melius meriti, vel iudice Momo.

Io. Dauntsey.



OF
NATVRALL
BATHES,
AND
MINERALL WATERS.

CAP. I.

Explication of the word Bathe. The scope and argument of this Booke. The ancient vse and esteeme of Bathes among the Romans. The moderne vse of them among the Turkes. Of medicinable Bathes, and minerall Waters. How esteemed by Greekes, Latines, Arabians, & other nations.



HE word *Bathe* or *Balneum* is of larger extent then I purpose to discourse of: for it being the name of a forme of remedie applied to the body, it may be framed either out of liquid things, or solid substances, or vapours.

Liquid Substances are Water, Milke, Must, Wine,
B Oyle:

Oyle: solid substances are Sand, Salt, pressed Grapes, Corne, &c. vapours are Stuffles and hot houses.

My intent is onely to treat of waters, and principally of those which be called Minerall, whether they be used in Bath or in Potion, &c.

*Pancirollus de
deperditis.*

These kinde of watrie Bathes haue beene in vse from all antiquity, and held in great esteeme. Among the ancient Romans there were no Buildings more magnificent then their Bathes, whereof there are reported to haue beene in *Rome*, 856. The chiefe of these were the *Anthonin*, and *Dioclesian* Bathes; the walles whereof were of admirable height, with an infinite number of marble Pillars, erected for ostentation, and not to support any thing, 1000 Seates to sit in; Their *Caldaria*, *Lepidaria*, *Frigidaria*, most sumptuous and stately: the whole fabricke so large and spacious, as they resembled rather Cities then Houses. And so it might well be, when as there were imployed for the building of the *Dioclesian* Bathes, as *Baccius* saith, 4000. men, but *Sal-muth* saith, 14000. for some yeares together. They were placed where now the Church of Saint *Angelo* stands. The Turkes at this day retaine that ancient custome of the Romans, and are in nothing more profuse, then in their Temples and Bathes, which are like vnto great Pallaces, and in euery Citie very frequent: And yet both the Romans and the Turkes vsed those Bathes onely for pleasure, and delicacy, and cleanness: the Romans going barelegged, and their waies dusty, had need of often washing: and the Turkes lying in their cloathes, subiect to Lice and wormes, if it were not for their often bathing.

*Belonius obser-
uat. lib. 3. cap.
34.*

Now if those Nations would bestow so much vpon their Bathes of delicacie and pleasure, which were onely of pure water; wee haue much more reason to adorne

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our minerall Bathes; which (besides the former vses) are also medicinall and very soueraigne for many diseases, consisting of wholesome minerals, and approued for many hundred yeares, of many who could not otherwise be recovered. At the least wise if wee doe not beautifie and adorne them, yet we should so accommodate them, as they might serue for the vtmost extent of benefit to such as neede them.

For there is nothing in our profession of Physicke more vsfull, nor in the workes of nature more admirable, (man onely excepted, which *Plato* calls the great miracle) then naturall Bathes, and minerall Waters. The nature and causes whereof haue beene so hard to discover, as our ancient Authors haue written little of them, holding them to be sacred or holy, either for that they iudged them to haue their vertue immediately from God, or at least from the celestiall Bodies; from whence, both their actuall heate was thought to be kindled, by lightnings or such like impressions, and other admirable vertues, and sometimes contrary effects deriued, which appeare in them: Also diuers miracles haue beene ascribed vnto those naturall Bathes, to confirme the opinion of a supernaturall power in them, as *Guay-nerius* reports of the Bathes of *Aque* in *Italy*: and *Lan- gius* out of *Athenaeus*, concerning the Bathes of *Edepsus*, which both lost their vertue for a time. The one by the Magistrates prohibiting poore diseased people to vse them, the other by imposing a taxation vpon them: but vpon the reformation of those abuses, were restored to their former vertues againe.

Cap 2.
Epist. 53. lib. 2.

I neede not herein auerring the opinion of Diuinitie which was held to be in Bathes, make any mention of the Poole of *Bethesda*, written of by Saint *Iohn*, and *Nonnus* the Poet: nor of the riuer *Iordan*, which cured

Naman the *Assyrian* of his Leprosie: being indeede true miracles, and done by a supernaturall power: yet it is likely that those and such like examples bred in the mindes of men a reuerend and diuine opinion of all Bathes: especially where they saw such strange effects as they could not well reduce to naturall causes.

And this hath beene the cause that in old time these mincral fountaines haue beene consecrated vnto certaine dieties: as *Hamon* in *Libya*, vnto *Iupiter*: *Thermopyla*, vnto *Hercules*, by *Lallas* among the *Troglodits*, another to the *Sun*, &c. And at this day we haue diuers Bathes which carry the names of *Sunne*, *Moone*, and *Saints*: and many Townes and Cities named from the Bathes in them: as *Therma* in *Macedonia* & *Sicily*, *Thermidea* in *Rhodes*, *Aqua* in *Italy*, *Aquisgran* in *Germany*, *Baden* in *Heluetia*: and our ancient Citie of Bathe in *Sommerfetshire*, in honour whereof I haue especially vndertaken this labour, and I perswademy selfe, that among the infinite number of Bathes and mincral waters which are in Europe, there are none of more vniuersall vse for curing of diseases, nor any more commodious for entertainment of sicke persons, then these are:

De tuenda sa-
nit. lib. 4. cap. 4.

Besides this sacred conceit of Bathes, wherewith in ancient times, the mindes of men were possesst, we may adde this, that the nature of Minerals was not so well discovered by them, as it hath beene since: and therefore wee finde very little written of this argument, either in *Aristotle* or *Hippocrates*, or in *Galen*, who wrote most copiously in all other points of Physicke, yet concerning this bath little; and neuer gaue any of these waters to drinke inwardly, although hee acknowledgeth that they were in vse: and for outward vses, held them all to be potentially hot.

After these *Grecians*, the ancient *Latines* and *Arabians*

bians succeeded: *Pliny, Celsus, Seneca, Lucretius, Aui-*
cen, Rhafis, Seraphio, Auerrhoes, in whom wee finde
 some small mention of naturall Bathes, and some vse of
 Salt and nitrous, and Aluminous waters, but nothing of
 worth towards the discouerie of the naturall causes of
 them. It is likely they did passe it ouer slightly, either by
 reason of the difficulty in searching out the causes of
 them, or that they iudged them meere metaphysicall.
 But in later times the nature and generation of Minerals
 (from whom the Bathes proceede, and from whence the
 Bathes proceede, and from whence the whole doctrine
 of them both for their qualities, and differences, origi-
 nals and vse, must be deriued) being better looked into,
 and obseruations taken from such as daily labour in the
 bowels of the earth, for the search of Mines, or such as
 afterwards prepare them for our necessarie vses, we haue
 attayned to better knowledge in this kinde, then the
 Ancients could haue, although in all new discoueries
 there will be defects for succeeding ages to supply, so it
 falls out in this: *Dies Diem docet: Alpham Beta corrigit.*
 And although *Agriola, Fullopius, Baccius, Mathesius,*
Solinander, Libanius, &c. haue added much vnto that
 which was formerly knowne in this point, and refor-
 med many errors and mistakings in former writers: yet
 they haue left many things imperfect, doubtfull, ob-
 scure, controuerted, and perhaps false, as may appeare
 in the discourse following. I doe reuerence all their
 worths, as from whom I haue learned many things
 which else I could hardly haue attained vnto; and I ac-
 knowledge them to haue beene excellent instruments
 for the aduancement of learning: yet I hope it may bee
 as free for me without imputation of arrogancie to pub-
 lish my conceits herein, as it hath beene for them, or
 may be for any other: *Hanc veniam petimusque damus-*

que vicissim. My end and studie is the common good, and the bettering of this knowledge: and if I shall bring any further light to increase that, I shall be glad: otherwise my intent being to search out the truth, and not to contradict others, it will or ought to be a sufficient protection for mee, wherefore I come to discourse of Minerall waters.

CAP. 2.

Definition of Minerall waters. The nature whereof cannot be understood, except first consideration be had concerning simple water. Of which in this Chapter are shewed the qualities and use.

Libanius de iudicio aquarum miner. cap. 1.

Minerall waters are such, as besides their owne simple nature, haue receiued and imbibed some other qualitie or substance from Subterraneall Mynes. I say, besides their owne nature, because they retaine still their liquidnesse and cold, and moysture, although for a time they may be actually hot from an externall impression of heate, which being gone, they returne to their former cold againe. I say imbybed, to distinguish them from confused waters: as earth may bee confused with water, but not imbybed, and will sinke to the bottome againe: whereas such things as are imbybed, are so mixed with the water, as it retaines them, and is vnited with it: being either Spirits, or dissoluble Iuyces, or tinctures; I say from Subterraneall mynes, to distinguish them from animall or vegetable substances, as infusions or decoctions of hearbs, flesh, &c.

Seeing then that the Basis of these Bathes or minerall fountaines, is water, we must first consider the nature of simple water, and from thence wee shall better iudge of Minerall

Minerall Waters and their differences.

By simple water I doe not meane the Element of water, for that is no where to be found among mixt bodies, but I meane such water as is free from any heterogeneous admixture, which may alter either the touch or taste, or colour, or smell, or weight, or consistence, or any other qualitie, which may be discerned either by the senses, or by the effects. This water therefore must haue his proper colour and taste, without sauour, or smell, thin, light, cold, and moyst; if any of these properties be wanting, or any redownd, it is mixed and infected.

Cold and moysture doe abound in water more then in any other Element. For cold appeares by this, that being heated by any externall cause, it soone returnes to his cold nature againe, when the cause of the heate is removed. And whereas Ayre is held by the Stoicks to be most cold, and confirmed by *Seneca*, and *Libanius*, yet the reason they giue for it, doth proue water to be more cold, because they make the matter of ayre to be water, and to haue his coldnesse from thence. But *Aristotle* holds the ayre to be hot from the efficient cause which rarefied it, being of more validitie to make it hot, then water (the materiall cause) to make it cold. *Galen* is of neither side, for he doth not iudge it to be hot, neither doth he euer pronounce it to be cold: but by reason of his tenuity, apt to be altered either by heat or cold. As for moysture, *Aristotle* holds the Ayre to be most moist, and water most cold. *Galen* holds Water to be most moist. *Aristotles* reason for the predominance of moysture in Ayre, is, because it is most hardly contained within his bounds: but the termination of things, proceeds from their opposite qualities, as moysture is terminated by drynesse, and drynesse by moysture: and drynesse doth as easily terminate moysture, as moysture doth

Baccius lib. 1.

cap. 6.

Solimander lib. 1.

cap. 1.

Solimander lib. 1.

cap. 3.

Quest. nat. 2.

Libani. pyrotech.

cap. 20.

Ari. Meteor. 4.

Galen De usu partium

lib. 8. cap. 3.

De ortu & inter

lib. 2. & meteor.

4. cap. 1 & 4.

Gal. de simpl.

med. fac. lib. 12

cap. 8. Item de

Elementis.

Valesius cont.
lib. I. cap. 2.

De aere, aquis
& locis.

De morbis popu-
lar. lib. 2. sect. 2.

Brucrinus de re
cibaria lib. 16.
cap. 7.

Saturnal. lib. 5.
cap. 18.

doth terminate drynesse. And this difficulty of termina-
tion in Ayre, may more properly bee ascribed to his
thinnesse and tenuity of parts, then to his moysture.
For dry exhalations will extend themselues as well as
moyst vapours; and as it is density that compacts, so it
is rarity that extends. Fire it selfe is hardly bounded, and
yet, not moyst. Those that would reconcile these diffe-
rences, doe alledge that *Galen* speakes as a Physitian,
and meant that water was *humidissimum medicamen-
tum*: *Aristotle* as a Philosopher meant it to be *humidif-
simum elementum*. But this reconciliation giues little sa-
tisfaction. For how could water be *humidissimum me-
dicamentum*, if it were not *humidissimum elementum*?
We speake of the proper operation of water according
to his naturall qualitie, and not as it may worke by acci-
dent. Thinnesse and leuitie are two other qualities of
simple water, which *Hippocrates* commends, and addes
this experiment in another place, that it is quickly hot,
and quickly cold. *Galen* addes another experiment in
the quicke boyling of Peasen or Beanes. And it is requi-
site that water should haue these qualities, in regard of
the manifold and necessarie vses of it, both for Man and
Beast, and Plants: insomuch, as there is no liuing for any
creature, where there is no water. It was our first drinke
to quench our thirst, and to distribute our nourishment
as a *vehiculum*, which it doth by his tenuitie, and after
the inuention of Wine, it was mixed therewith, as *Vir-
gil* saith of *Bacchus*, *poculaque inuentis Acheloiā miscuit
vni*; where, by *Acheloiā*, he meanes not onely the water
of the Riuer Achelous in Etolia, but all other waters, as
Macrobius proues out of *Aristophanes* and *Ephorus*. And
since the planting of Vineyards, seeing all Countries
could not beare Grapes, *Bacchus* also taught the world
to make *vinum è frugibus* with water, as *Diodorus*

Siculus

Siculus reports,
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Siculus reports, from whence the Egyptians had their *Zithum* and *Curmi*, the Spaniards their *Cerea*, the Turkes their *Cowfet*, and wee our *Ale* and *Beere*; all which are extracted out of Corne, by the purenesse and renuitie of water. By meanes whereof wee haue our Brothes, Syrupes, Apozemes, &c. extracted with it, as a fit menstruum to receiue the faculties of all medicaments and nourishments, especially the second qualities, and therefore it was anciently called *Panspermia*: besides the manifold vses in washing, dying, &c. of which I will not discourse farther. Leuitie is another note of pure water, alledged by many, and serues well to distinguish it from many mixed waters, whether wee respect the weight of it, or the molestation which it breedes in the bowels. This difference of weight is hardly discerned by ballance, both because simple waters doe very little differ in this point, and also many mixt waters, if they be onely infected with Spirits, and not corporall substances, retaine the same proportion of heauinesse with simple water: and also because it is hard to haue great ballances so exact, as a small difference may be discerned by them, yet *Agricola* reports that a cotyle of the water of Pyrene and Euleus, did weigh a dram lesse then the water of Euphrates, or Tigris, and therefore the Kings of Persia vsed to drinke of it, and held it in great account, as also the water of the Riuer *Coaspis*. Thus much for the qualities which simple water should haue, for such as it should not haue, I shall not need to spend time in discourse, being either such as the senses will discouer, if it bee in taste, colour, smell, or touch; or the effects, if it be purgatiue, vomitory, venomous, &c.

*Rerum anti-
quar. lib. 4. c. 2.*

Baccius lib. 1. c. 7

*De nat. eor. quib
effl. & terra lib. 16
cap. 15.*

*Iangius Epiſt.
lib. 1. Epiſt. 31.*

CAP. 3.

Of the three originals of simple waters.

Bacius lib. 1.
cap. 3. 4. Agric.
de ortu & causis
subterr. lib. 1.
cap. 1. 2. 3. 4. 5.
6. 7. 8. 9.
Solinander lib. 2.
cap. 1. & lib. 1.
cap. 3.

NOW it followeth that we shew from whence these waters haue their originall, which is no other then of the mixt waters, sauing that the mixt waters doe participate with some minerals which are imbybed in them.

They haue three seuerall Originals: the one from moyst vapours congealed by cold in the ayre: the second from the earth; the third by percolation from the Sea.

For the first, it is certaine that our Springs and Ri- uers doe receiue great supply of waters from the Ayre, where vapours being congealed by cold, doe fall downe vpon the earth in raine, or snow, or haile, whereby the ground is not onely made fertile, but our Springs are reuiued, and our Riuer increased. As wee see the Rein and Danubius to swell more in summer then in winter, because then the snow which continually lyeth vpon the Alpes, doth melt by the heate of the sunne, and fils those Riuer, which haue their Originals from thence vp to the brinckes. Also we see daily after much raine, our small Lakes and Riuer to be very high. Also vpon much dryth our Springs faile vs in many places, which vpon store of raine doe supply vs againe with water. And this is the cause that in most parts of Africa, neere the Equi- noctiall, where it raines little, they haue little water; and many times in two or three dayes iourney, can hardly finde to quench their thirsts and their Camels. *Leo A- fricanus* speakes of an Army wherein were many Ca- mels, which in their marching, comming to a Riuer (perhaps it was but a Brooke) did drinke it dry. So that

we

we must acknowledge that the earth receiues much water this way. But how this should serue the bowels of the earth with sufficiencie for the generations there, and for perpetuall springs, is very doubtfull; whereas *Seneca* saith that these waters doe not pierce aboue ten foot into the earth: neither if there were passages for it into the bowels of the earth, can the hundred part of it be imployed this way, but is rudely conueyed by Ri- uers into the Sea. Wherefore although much water bee yeelded to the superficies of the earth by raine, and snow, and haile from the ayre, yet not sufficient to main- taine perpetuall Springs; seeing many times, and in ma- ny countries these aeriall supplies are wanting, or very spare, and yet the Springs the same. Wherefore *Aristo-* 2 Meteorol. lib. 3. cap. 7. *le* his opinion, which attributes all to aeriall water and vapours, from thence, is iustly reiected by *Agricola*, and by our country-man Master *Lydiat*. So that wee must finde out some other Originals, or else wee shall want water for the manifold vses the earth hath of it: from the earth they make another originall of perpetuall Springs and Riuers, seeing the first seemes to be ordained by na- ture onely for the irrigation of the superficies of the earth, which else would be in most places destitute of water, where Springs are not, and so would be barren, plants and trees wanting due moysture for their nou- rishment. Wherefore for the perpetuitie of fountaines, and for Subterraneall generations, which cannot pro- ceede without water, they haue imagined a generation of water within the earth; some holding that the earth it selfe is conuerted into water, as elements are held to be mutable and conuertable, the one into the other. But neither fire will be conuerted into any other element, be- ing superiour vnto the rest, and not to be mastered by cold, which onely must be the agent of the conuersion

Aristot. 4. meteor: cap. 10. & ultimo.

Valesius de sacra philosoph. passim.

of it by condensation: neither will earth be conuerted into water, for either heate or cold must conuert it. Heate cannot doe it, although it rarifie and attenuate, both for that it consumes moysture, and also because water is cold, which it should not be, if it were made by heat; for euery naturall Agent workes to that end that it may make the Patient like it selfe: and heate may conuert earth into fume and dry exhalations, but not into water, for all water which is not eternall, is from cold; likewise cold cannot conuert earth into water, because cold doth congeale, condense, and congregate, and indurate, and not dissolue and attenuate, &c. as wee see in Amber and Gummes. Others will haue great receptacles of ayre within the earth, which flying vp and downe, is congealed by the coldnesse of Rockes into water, to supply all wants. Others imagine huge Lakes and Cisternes, primarilie framd in the earth, and supplied with water, either from vapour or ayre, or from the sea; which water either by agitation, by winds, or by impulsions from the sea, or by compression of Rocks, is eleuated to the Superficies of the earth: or els vapours from thence, made by attenuation, either from the Sun and Starres, or from Subterraneall fire kindled vpon Sulpher and Bitumen; which vapours ascending to the tops of mountaines, are there congealed into water by the coldnesse of the Rockes; where there must be other Cesternes or Castles in the ayre to feede the inferiour Springs. These and such like deuices are produced for the maintaining of the Originall; which as they are all insufficient to afford such a proportion of water as is requisite, so most of them are so improbable, and full of desperate difficulties, as I am vnwilling to spend time in the rehearsing of them, or their Authors, much more vnwilling in confuting of them, to trouble my selfe, and offend

offend my Reader, onely the poynt of Subterraneall fire which hath taken deepest impressiō in most mens mindes, I shall speake of hereafter, when I come to shew the causes of the actuall heate of Springs. The third Originall is from the Sea, a sufficient storehouse for all vses, and whereunto the other two may be referred. For that which fals from the ayre, and that which is bred in the earth, doe proceed principally from the Sea. *Agricola* De ortu & causis subter. lib. 1. cap. 5. & 9. for feare of wanting water for his Springs, is contented to admit of all these Originals, although he relyeth least vpon the Sea, because he knowes not how to bring it vp to the heads of his fountaines, but is contented it should serue for lower places neare the Sea coste. As I remember I haue seene in Zeland at Westcapell, fresh Springs colated from the Sea, through bankes of sand. But I make no doubt but that the Sea water may serue all other Springs and Riueres whatsoever, although both farre remote from the Sea, and high in situation. Neither shall we neede to flye for helpe to those monstrous conceits of Agitation, Compulsion, Compression, Suction, Attraction by the Sunne, &c. But holding the sacred Canon of the Scriptures, that all Riueres are from the Sea, &c. I perswade my selfe, that there is a naturall reason for the eleuating of these waters vnto the heads of Fountaines and Riueres, although it hath not yet beene discovered. For those opinions formerly mentioned will not hold water. Ecclesiastes 2.

My conceit therefore is this, that as we see in *Siphunculis*, that water being put in at one end, will rise vp in the other pipe, as high as the leuell of the water (whether by his waight, or by the correspondence with his leuell, I will not dispute) so it may be in the bowels of the earth; considering that the passages there are more firme to maintaine the continuitie of the water with the

Sea, then any leaden pipes can be, being compassed on euery side with many Rockes: as we see in *Venis, fibris & commissuris saxorum*. Now although perhaps this water enters into the earth very deepe, yet the leuell of it must answer to the superficies of the Sea, which is likely to be as high as the superficies of the Land, seeing the natural place of waters is aboue the earth. And although neere the Coasts it bee depressed and lower then the Shoare, yet there is reason for that, because it is terminated by the dry and solid body of the earth: as we see in a Cup or Bowle of water filled to the top, we may put in a great bulke of siluer in pieces, and yet it will not run ouer, but be heightened aboue the brims of the bowle. If this be euident in so small a proportion, we may imagine it to bee much more in the vast Ocean: and our Springs being commonly at the foot of hils, may well be inferiour to the Globe of the Sea, if any bee higher, they may perhaps be fed from raine and snow falling vpon the mountaines. But if *Iosephus a Costa*, his assertion bee true, that the Sea towards the Equinoctiall, is higher then towards the Poles, then the leuell of the Sea may bee much higher then the top of our highest hils, but this is a doubtfull assertion: yet I dare beleue that if it were possible to immure a Spring without admission of ayre, which might breake the continuitie with the Sea, our Springs might be raised much higher. At Saint *Winifrids* Well in Flintshire, though there be no high land neere it, yet the Springs rise with such a violence, and so plentifully, that within a stones cast, it driues a Mill. It is likely that this Spring might be raised much higher. And whereas we see that Riuers doe run downewards to the Sea *per decline*, it doth not proue the Sea to be lower then the Land, but onely neere the shore where it is terminated, and in lieu of this it hath

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scope assigned it to fill vp the Globe, and so to be as high as the Land, if not higher. For if a measure should be taken of the Globe of the earth, it must be taken from the tops of the Mountaines, and from the highest of the Sea, and not from the Vallies, nor from the Sea-coasts. This conceit of mine I was fearefull to publish, and therefore had written vnto Master *Brigges*, mine ancient friend, for his aduice in it, being a point wherein he was well studied: but before my Letter came to Oxford, he was dead. But now I haue aduentured to publish it, to stir vp others to search out the causes hereof, better then hath yet beene discouered. *Exors ipse secundi, fungor vice cotis.*

CAP. 4.

Diuision of Minerall Waters. Minerals described. Their kinde recited. Of earth, simple and mixed. Whether it giue any medicinable qualitie to water. And so of the rest in the following Chapters.

THUS much of simple waters, and their originals, which may serue as *Polycletus* his rule to iudge mixed and infected waters by: as *Galen* in many places speakes of an exact and sound constitution of body, as a rule to discerne distempered and disproportionated bodies. And thus much in explication of the *Genus*, in the definition of Minerall waters.

Now I come to Minerall Waters, and to the other part of the definition which wee call difference, &c. from Subterrancall Mynes by Imbibition.

These Minerall waters are either simple or compound; simple, which partake but with some one Subterrancall Minerall; compound, which partake with
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more then one. And these waters partake with Minerals, either as they are confused with them, or as they are perfectly mixed. Also these minerall waters, whether simple or compound, are actually either hot or cold; the reason whereof must proceede from some Subterraneall cause, as shall be shewed hereafter.

Wherefore wee must first know the nature of these Subterraneall Minerals, and their generation, from whence Minerall waters receiue their difference, from common simple water, before wee can iudge of the nature and qualitie of them, either Actuall or Potentiall.

By Minerals, we vnderstand all Inanimat perfect bodies, bred in Mynes within the bowels of the earth. I dare not vndertake to muster these in due order by Dicotomyes, seeing neither *Agricola* nor *Fulopius*, nor *Libanius*, nor any other that I know, haue exactly done it, nor satisfied either others or themselues in it: and seeing there are diuers Minerals lately discovered, and perhaps more may bee hereafter, which haue not beene knowne in former times, and therefore not mentioned; as *Calaem* in the East Indies, *Rusma* and *terra ghetta* in Turkey, &c. Wherefore I will make bold to reckon them vp as they come to hand in seauen rankes.

The first shall be Earth.

Earth whether it be bred *ab exhalatione sicca refrigerata*, or *ex mistis per putredinem in fimum conuersis*, or *ex lapidibus sole aut calore coctis & deinde aqua solutis*, &c. it is all inconcrete. As a little water gleweth it together in *Lutum*, so a great deale dissolues it. But this is no proper dissolution, but onely a disioyning of parts by Imbybing the moysture which conioyned them, into a greater proportion of water; for waters doe naturally runne together, like drops of quicksiluer, or melted mettall. Wherefore seeing the moysture which is in the

the earth, is not naturall, bur aduentitious, not vnited essentially, but onely mixed accidentally, it may well be called an *inconcrete* substance, whose moysture is easily drawne from it, being readie to vnite it selfe with other moysture, and leaue his old body as it found it, that is, dust: yet so as that water retaines with it some taste or qualitie which it receiued from the earth. This dust is neither a simple body, as Elements are, nor permanent in one and the same kinde: but as it participates with *animales vegetables*, and minerals, so it is apt to bee transmuted into any of them, being both Mother and Nurse to all terrestriall bodies.

*Agric. de nat.
fossil. lib. 1.
cap 4.*

Simple earth, if it be not mixed with other substances, is dry and cold, and Astringent. But if it bee mixed, as commonly it is, it altereth his qualitie according to the mixture. Mine intent is to write of it as it is simple, and so of the rest.

Simple earth yeelds but a muddie water of it selfe, and of no vse in Physicke, but if it be mixed with other Minerals, it makes the water to participate with the quality of those Minerals also. As if it be mixed with niter, as in Fullers earth and Marle, it makes the water abstergent like Soape. If with Allum or Coppereffe, astringent and more desiccatiue, as in all sorts of Boles. If with Bitumen, fattie and Vnctious, as in Turfe and Peate, &c. We haue diuers examples of all sorts. The Bath of Mount Othon in Italy is full of clay, which is a kinde of Bole. The Bath Caldaria, full of Ocre. The Bath of Saint Peter full of a yellow earth, tinged belike with some other Minerals. Wherefore these are to bee iudged of according to the seuerall Minerals which they containe. But seeing earth it selfe makes little impression into water, neither doe wee make any Physicall vse of waters, which containe nothing but earth, I neede not spend any time about them.

*Baccius lib. 5.
cap. 1.*

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CAP. 5.

Of Stone.

De metallis
cap. 6.

THe second shall be Stone. Stone is another Minerall substance, concrete and more heauie then earth, and our Minerall men confound themselves much in the definition of it. Wherefore *Fallopins* implores the helpe of *Marcus Antonius Iunica* about it, as one of the most difficult points in Philosophie: but in the end, defines it by his want of dissolution, either by heate or moysture. And whereas it is manifest that some Stones will melt, he imputes it to the admixture of some mettall, among which he receiueth glasse. Others define it by his hardnesse, wherein commonly it goeth beyond other Minerals. But you shall haue some stones softer then some of those, and therefore the definition is not good. Others by this, that being broken or calcind, they will not bee consolidated againe into their former consistence or shape. But for breaking, the reason of that, is want of fusion; for without fusion or ignition, which is a kinde or degree of fusion; Mettals also being broken, will not be consolidated into the same Masse againe. And there is no more difference in nature or essence, betweene a whole stone and a broken, then there is betweene a masse of Mettall, and the powder or filings of the same: As for calcination, other minerals may bee so far calcind, and brought to a Crocus by fire, as they will be irreducible, therefore this is not proper to stone. Wherefore I am of *Fallopins* his opinion in this point, and the rather because otherwise there would seeme to be a species in nature wanting, if there were not Minerall Species wanting, dissolution by heate or moysture, as well as there are, hauing such dissolution. And this *vacuum* which
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If Sulphur

nature abhorres, is not onely to be vnderstood of a locall vacuitie, but also of a want of such species as are in natures power to produce, for the ornament of the world. For if it be a naturall passion to be dissolued, it is likewise a naturall passion not to bee dissolued: and if some things will bee dissolued both by heate and moysture, as Salts, why should there not be other substances which will be dissolued by neither of them. And this must be stone, for nature affords none other. Moreouer according to *Aristotle*: *Quæ concreuerunt a frigido & a calido, a nullo istorum dissoluuntur*. Of this kinde are Stones which could neuer attaine to such puritie as many of them haue, if they were not congealed by heate as well as by cold. Also vnder what species shall we comprehend, Diamonds, Talcum, *Magnetis*, *Glymmer*, *Katzensilber*, *pyrimachus*, *amiantus*, *alumen plumosum*, *saxum arenarium mortuum*, &c. if not among Stones? yet these are confessed to be inuincible by fire or water. Also all pretious Stones, the more noble and pretious they are, the more they resist dissolution either by fire or water: for this qualitie sheweth the perfection of their mixture. True it is that some stones wilbe dissolued by fire or water, and therefore *Pliny* and *Agricola* diuide Stones into fusible and infusible: but this is in regard of other substances bred in the stone, which if it be Metall, the fusion will be Metallin: If Niter or meane Minerals, it will bee vitrificatorie. As *Pliny* reports of the inuention of Glasse by certaine Merchants, who melting Niter vpon the sand in Siria, where with clods of Niter they had made a furnace for their necessary vse; found that cleere mettall which we call glasse, *Ecce liquato nitro cum arenis visi sunt riui fluxisse nobilis liquoris*:

If Sulphur, as in pyrite, it will likewise melt and strike fire.

Erastus disput.
part. 2. pag. 205.

fire. And whereas the striking of fire out of a flint or pyrites, is held by all men to proceede from the kindling of ayre, by the collision of two hard substances together, they are mistaken. For then Diamonds, Chrystall Glasse, &c. should strike fire as well as flints, but it is the Sulphur contained in them: And G. Fabricius in his observations, although hee obserues not the reason of this fire, yet he confesseth that out of any Pyrites *è quo excutitur ignis, etiam excoquitur sulphur*. Pliny giues the reason of the name, *quia inest ignis illi*. The like we obserue in Indian Canes, and some Woods that are vntuous, and full of oyle, which will yeeld fire by frication, or collision, not by kindling the ayre thereby, but the inflamable oyle in them. If other concrete iuyce bee mixed with stone, as Salt, Allum, Vitrioll, &c. it makes them to relent in water or moyst ayre; and these stones are neuer good to build withall. But let vs take stone as it is in it selfe, without the admixture of other Minerals, and we shall find it to be indissoluble and inuincible, either by fire or water. Metallurgians and Refyners may make vse of this for their Shirbs, Tiegles, Hearths, Tests, &c. Stones are naturally dry and cold, and astringent like a concrete earth.

Simple Stones which haue no other Minerals mixed with them, and are come to their perfection, being indissoluble, either by fire or water, can yeeld no qualitie or vertue to Bathes, and therefore hee that seekes to draw any vertue from stone into water, doth *lapidem lauare*, that is, labour in vaine. But by reason of admixtures, they may, or whilest they are *succo lapidescente*, before they are concreted. For if it be certaine that metals may yeeld vertue to Bathes, being alike indissoluble by water, there is no reason but Stones also may. *Fullopplus* is against it in both, but contradicted by *Iulius Caesar*,

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Cæsar, Claudius, and diuers others; yet hee confesseth that *Balneum montis Grotti*, hath *Gypsum*: and *Gesner* affirms the same of the Baths of *Eugesta*. Also he findes *ramenta marmoris in Balneo Corsenæ & Agnano*, but he iudgeth that they receiue no qualitie but from the iuyce, and I doubt not but he is in the right. And for *succus lapidescens*, we haue many examples in *Agro Pisano & Lucensi* in Italy, in *Auernia* in France, where this iuyce is so plentifully brought by a cleare Spring, that after it is congealed, the people digge the stones, and haue made a great bridge of them. Also neere *Vienna* in *Sauoy*, in a village called *Giaret*, is a cleare fountaine which turnes to stones as hard as flints: *Pliny* makes mention of the like Springs in *Eubœa*, which are hot: and *Vitruuius* of the like at *Hieropolis* in *Phrygia*: Also *Iosephus a Costa* of the like hot Springs in *Guaniauilica* in *Peru*, which turnes to stone, whereof they build their houses. *Anthônio de Herreza, cap. 20.* tels of the same Spring at *Guainia velica*, which turnes to stone as it ariseth, and kils those that drinke of it. Also this *Succus lapidescens* is obserued in the Bathes of *Apono*, where it is conuerted into stone vpon the sides of the Bath. Also in the Bath of *Rancolani*, where this iuyce is not confused, but perfectly mixed with the water, & being imbybed by plants, it hardens them like stone. *Bac-* Lib. 6. c. 14
cus tels vs of a Caue by *Fileg* in *Transilvania*, which turnes water into stone. The like is found at *Glainstaynes* in *Scotland*, as *Hector Boerius* reports. In *England* also we haue many fountaines which turne wood into stone: which must be by reason of this *succus lapidescens* mixed with the water. Corall also being a plant, and nourished with this iuyce, turnes to a stone: so doth the seede of *Lithospermon* or *Gromell*. Thus much of stone.

CAP. 6.

Of Bitumen. His kindes, qualities. Of Camfor in particular. That Bitumen is predominant in the waters of Bathe.

NEXT I come to those Minerals which we call *Bitumina*, which are Minerall substances that burne and waste in the fire without metallin fusion, or ingression. The greatest affinitie they haue, is with Sulphur: but this hath ingression into mettall, and Bitumen hath none. Of this kinde some are solid, and some liquid. Solid, as *Succinum*, *gagates*, *ambra*, *camphora*, *terra ampelitis*, *Lithanthrax*, *sive carbo fossilis*, &c. Liquid, as *petroleum* and *naphtha*. All these are great fuels to fire, especially those that are liquid, which are thought to draw fire vnto them, if it be within their *effluuium*. So *Pliny* reports that *Medea* burnt *Creusa* by anoynting her Garland with *Naphtha*: and *Strabo* tels how *Alexanders* Bath-master, *Athenophanes*, had almost burnt *Stephanus*, a boy in the Bath, by sprinkling *Naphtha* vpon him, if it had not beene suddenly quenched. And this is that iuyce or thicke water which *Plato* in *Timeo* reckons among fires, and which the Egyptians vsed in their sacrifices, and was hidden by the Iewish Priests in a dry pit for 70. yeares, and afterwards found by *Nehemias*.

Machab. 2. 1.

But whereas it is a common receiued opinion, that some of these *Bitumina* will burne in water, I cannot beleeue it: although *Plinie* and *Agricola*, and most that haue written since, out of them doe auerre it, and bring arguments and examples to proue it. For although water were a fewell to fire, as oyle is, yet there can bee no fire without ayre, and water excludes ayre: and so doth oyle,

oyle, if the fire be beneath it, and couered with it. As for their arguments, they say that Bitumen being besprinkled with water, burnes more, and therefore water is a fewell to it: as we see that Smiths cast water vpon their Sea-cole in their Forges: but the reason of this is because their Coale being small like dust, the water makes it to cake and bake together, where otherwise the blast would blow it away: also it hinders the quicke burning of it, and so makes it continue the longer: so in a *Vulcano* after raine, they finde the fire to burne more, when the Bitumen is small, and in dust. Although this may be a reason of it, that the Lyme which hath there beene calcined, being by raine dissolued, increaseth the fire. And whereas they say that water will kindle Bitumen, and quench Sulphur, it is not so: neither doth their example of Wilde-fire proue it. For in Wilde-fire, besides Bitumen and Campher, there is quicke Lyme, which by reason of the sodaine dissolution of his Salt, by the affusion of water, is apt to kindle any combustible matter; not by reason of any Bitumen in the Lyme, as some imagine, nor of any *Empyreuma* which the fire hath left in it, as *Tracasterius* thinks: for, how can there be any Bitumen left in the Lyme (if there were any at first) after calcination: the fire would haue consumed that before any thing else. And as for any *Empyreuma*, it is certaine that the more any thing is burnt, although the fire leaue an adustion in it, the lesse apt it is to burne againe, especialy being burnt and calcined *ad calcem aut cineres*, where all the combustible matter is spent. Wherefore it must needs bee by the violent motion which is in the suddaine dissolution of the salt in it, as appears by the crackling it makes: *Et ex motu fit calor*. The like we obserue in *Pyrite sterili* whereof they make Vitrioll, which being broken and laid vp in

De sympath. & antipath. cap. 10.

in heapes, and moystned with water, will gather heat, and kindle any combustible matter put to it. The like also we finde in Allum myne, &c. where those minerall iuyces being concrete in the Myne, when they come to suddaine dissolution doe grow hot, and will kindle fuell. And as for the example of the salt Lake whereof *Agricola* writes, betweene *Strápela* and *Seburgh*, which burnes the fishermens nets if they be put neare the bottome: and of the like *Sputa*, in *Media*, mentioned by *Strabo*, which burnes clothes put into it: I take that to be by reason of the corrosiue quality of the salt which frets them, being stronger neare the bottome; and not from Bitumen, as *Agricola* thinks. The like I iudge of the Lake by *Denstadt* in *Turingia*. And it is very probable that salt being heauier then water, wilbe most towards the bottome: as it is reported of the fountaine *Achilleus* in *Mileto*, whose water is very sweet and fresh aboue, and very salt towards the bottome. So is the water of *Agnano* in *Italy*, as *M. Sandys* reports in his trauels. And the more heauy and terrestriall any salt is, the more corrosiue it is: and so contrariwise, the more corrosiue, the more heauy: *Aristotle* affirmes the sea water to be more salt at the bottome then aboue: and so doth *Pliny*, who likewise makes mention of the Lake *Ascanius* in *Chalcide*, whose top is sweet, and bottome nitrous. *Baccius* writes the like of a Well neare *Tolatum* in *Spaine*, the water whereof is sweet aboue, and corrosiue beneath: which he iudgeth to be from Quick-siluer. *Fulopius* is also of opinion, that Bitumen doth not only burne in water, but is nourished by water, because it makes the fire to last longer. But I haue shewed the reason of that before. And for the burning in water, he should haue said vpon the water; for there it wil burn as long as it swimmeth; but dip it vnder the water, and it is presently extinguished. And

Denat. cor. q.
efflu. è terra.
l. 4. c. 22.

Meteor. 2.

Lib 6. c. 11.

De Thermis. c. 5.

And whereas some report that Queene Anne of blessed memory, being in our Kings Bath, there arose a flame of fire like a candle from the bottome of the Bath to the top neare vnto her, they must giue mee leaue not to belecue it, but rather to thinke they were mistaken: for, I am not bound to beleue any thing against reason, which God hath giuen mee to bee my guide. It might haue bene some bubble of winde which is frequent in our Bathes, or some Bitumious matter not dissolved in the water did arise, and being at the top, dissolve it selfe vpon the surface in the forme of a circle: but it could not be kindled. And if it might bee kindled in the water (which were impossible) yet in all likelihood it would haue burnt better aboue the water then within it, and not be presently extinct, as they report. These *Bitumiana* (excepting Camfer) are potentially hot and dry in the second or third degree; but concerning Camfer there are two doubts. First, whether it be a Bitumen or a Gum. Secondly, whether it be hot or cold. The Arabians affirme it to bee the Gum of a huge tree with white leaues, vnder whose shadow many wild beasts may lie: and that after earthquakes there is great plenty found; that it is in quality cold and dry in the third degree; some late writers follow them in their opinion of a Gum, as *Mathiolus*, *Amatus Lusitanus*, *Garrus ab horto*, &c. *Placarius* holds it to bee the iuyce of an herbe. But we must consider that they make two sorts of Camfer, the one of *Borneo*, the other of *Chyna*. For that of *Chyna* they confesse it is adulterated with Bitumen: and that is the only Camfer in vse with vs. But that of *Borneo* to bee a simple Gum, and that a pound of this is valued as deare as an hundred pound weight of the other. So that all the doubt lyeth in this Camfer of *Borneo*; which whether it be a Gum

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or

*Serapio de simp.
med. c. 344.*

Avicen. lib 1.

tract. 1. c. 2. Item

l. 2. tract. 2. cap.

133. Item de

med. cordial.

tract. 2. cap. 3.

In Dioscoridem
Cap. de mastice b.

Lib. I. Cap. 9.

De nat. fossil.
lib. 4. cap. 2.

Thesa. v. aquar.
lib. 1. cap. 2.

Comment. in Di-
osc. et Epist. 1. 3.
Thaddæo Nemi-
co.

De simpl. med.
facult. 4. 4. 2.

or no, is still in controuersie. For the Arabians not tra-
ding into those parts, had the notice hereof only from
others, as *Serapio* and *Avicen* doe confesse: and *Amatus*
Lusitanus saith that the inhabitants will not suffer stran-
gers to come ashore to see it. So as we haue beene kept
in ignorance a long time from the true knowledge of it.
And *Garrus ab horto* tels vs, that all his knowledge of
it, is but by relation: himselfe not being able to trauell
to see it; partly by reason of his age, and partly for his
continuall imployment about the Viceroy. Only *Ed-
uardus Barbesa* reports that he did see the place in *Bor-
neo*, and found it to be of a minerall nature. I procured
some of that Camfer to be brought from thence by my
worthy friend Captaine *Best*, but whether it be a Gum
or a Bitumen, by the view I cannot discern. But if it be a
Gum, why should it abound more after earthquakes?
and why should it burne and not dissolue in water?
No Gums will burne, and all Gums will dissolue in wa-
ter: and earthquakes make no trees fruitfull, but may
cast forth minerals. That there is a naturall Bitumious
Camphire, I make no doubt: and *Agricola* proues it
sufficiently: And the Bath in *Romandiola* neare *Rhegi-
um* shewes it. Also the Well by *Muntzbach* where *Ta-
berni montani* saith there is mineral Camphir. *Auerroes*
saith it is *affinis Bitumini*.

Now for the qualities of it, the most generall and tru-
est opinion is, that it is cold and dry. *Matthiolus* iudg-
eth it to be hot for three especiall reasons. First, because
it burnes, and is a great fuell to fire. If this argument
bee good, then flax, and straw, and paper, and touch-
wood, and spunk should be hot, for they are apt fuels
to fire. Secondly, because it is *odorata*, and hee holds
all *odorata* to be *calida*: *Galen* is of another opinion,
and holds the iudgement of simples by saour to be vn-
certaine

certaine. And as for Campher, *Galen* knew it not. *Avicen* saith expressely of Campher, that although it bee *Lib. i. tract. l. c. 2*
odorata, yet it is *frigida*. And if *Matthiolus* his reason
 were good, then Roses, and Violets, and Vinegar
 should be hot; for they are *odorata*. It is true that all
 fauors arise from heat, as *Galen* saith, and all compound-
 ed bodics haue some hot parts: but wee speake of the
 predominancy in the subiect. Thirdly, because it bites
 the tongue. So doth iuyce of Limons, and Barberies,
 and Vinegar, &c. and yet they are cold. Wherefore I
 conclude our Campher to be a Bitumen, and in quality
 cold and dry; and of very subtile parts. These *Bitumina*
 being vnctuous and oylie, dissolue not of themselues in
 water, without the helpe of some minerall iuyce, but
 may be confused with it. And wee haue many foun-
 taines and lakes which participate with them. In Shrop-
 shire at *Pitchford* is a spring that casteth forth Bitumen
 swimming vpon the water. The like we read of in *A-*
uernia in France betweene *Claremond* and *Monferan*,
 where the people gather it for their vses. In *Italy* there
 are many fountaines yeelding Bitumen, at *Maianum*,
 and *Sassoli*, and *Salsa*, and *Herculanum* at the foot of the
 mountaine *Vesuvium*, at *Baia*, and also at the cape of *S.*
Helena, and in the Isle of *Woolfs* there are fountaines of
 pitchie Bitumen, which are vsed to pitch ropes and
 tackling, as *Iosephus à costa* reports. And we haue that
 famous lake *Asphaltites* in *Iudæa* so full of Bitumen, that
 it hardly suffers any thing to sincke in it. The riuer *Li-*
paris in *Cilicia* by reason of a spring neare *Solos* is so
 full of liquid Bitumen, as they which swim or wash in
 it seeme to be anointed with oyle. Also there are Bitu-
 mious springs in *Saxony* at *Bruno*, in *Sweuia*, the lake
Tegera at *Gersedorf* vnder the mount *Iurat*; In *Asia*
 by *Tralleis* and *Nissa*. Also in the West Indies there

Bellonius de
Naphtha c. 72

Agric. de nat.
cor. que efflu. d
terra. l. 1. c. 7.

are many found which they put to vse for shipping. And this Bitumen is the chiefe ingredient in our Baths at Bath in Somersetshire, although dilated with much Niter, which makes the solution the better, and the water more cleare. That Bitumen is predominant in these our Baths, may bee proued by the effects, because wee finde them exceedingly to comfor the nerues, supple the ioynts, dry vp rheumes, cure Palsies, and Contractions, being distinctly vsed, tin& siluer into the colour of gold, &c. Also by the Bitumeous sauour of them, and by the neighbourhood of Cole mines in those parts. All which doe argue Bitumen to abound in them. And whereas Doctor *William Turner* in his treatise of these Baths, thinketh Brimstone to bee the chiefe minerall, and Copper next; I am out of his opinion. The actual heat is no argument of Brimstone, as shall bee shewed when I come to that point: nether doth the sauour bewray it. But his reason for Copper is very weake. He found a Marchesit vpon one of the hils, which hee thought to hould Copper. But Marchesits although they shew yellow, yet they seldome hold Copper, or any other metall. But his discourse hath perswaded *Iohn Baubinus* to publish it confidently to the world. I shall haue occasion to speake more of this hereafter. And thus much of *Bitumina*.

De thermis Boll.
1.3.6.1.

CAP.

CAP. 7.

Of Minerall iuyces concrete : called by the Alchimists, Salts. The foure principall sorts of them ; Salt, Niter, Allum, Vitrioll.

A Fourth sort of minerals are concrete iuyces which are minerall substances dissoluble in water. These the Alchimists call Salts, and are the meanes of communicating all other minerals with water. For as water is apt to dissolue and extract vegetables, so are these concrete iuyces apt to dissolue and extract minerall substances. And although they are found sometimes liquid being dissolued by moisture : yet we call them concrete, because they will be concrete when the aduentitious moisture is removed. Our minerall Authors doe make many sorts of these according to the severall minerals which they imbibe : but in truth they may bee all reduced to foure heads ; Salt, Niter, Allum, and Vitrioll. And each of these hath diuers species, as *Geber* and *Casulpinus* say of Salt, *quot genera calcium, tot genera salium*. Concerning Vitrioll there may bee some doubt whether it be a distinct species from Allum, and and haue receiued only some tincture from Copper, or Iron, or from some of their brood, which are called excrements: For in distilling oyle of Vitrioll, the lute wherewith the glasses are ioyned, will yeeld perfect Allum. And Vitrioll being boyld ariseth in balls as Allum doth, and shoots like Allum *in globos* ; as Salt doth *in tesseras*, and Niter *in stirias*. Among these concrete iuyces *Agricola* reckons Sulphur, Bitumen, Auripigmentum, Sandaracha, Chrysocola, Erugo, Myssi, Sori, Melanteria, &c. But if wee examine them aright, wee shall finde, that either they are not dissoluble in water as

Libanius in Syntagm. p. 221.

Casulpinus de metallis c. 3. l. 11

concrete iuyces should be, or they are some of those iuyces tincted or incorporated with other mineralls. All these minerall iuyces are accounted hot, and dry, and astringent, and detergent, some more, some lesse: and we take it so vpon trust. But this point requires further consideration and distinction.

*Diosc. l. 5. c. 84.
De simpl. med.
facult. l. 4. c. 26.
& l. 11. c. 50.*

Salt is astringent, detergent, purging, dispersing, repelling, attenuating, makes an eschar, and preserues from putrifaction, as *Dioscorides* informes vs, and *Galen* confirms the same, adding that it is hot. But we must vnderstand *Galen* with this limitation, *lib. 6. cap. 30*. That the more it is deterfory, the lesse it is astringent. And all astringent things are cold, as hee auoucheth, *lib. 4. cap. 6. Acida, acerba, & astringentia omnia frigida*. Now if salt be astringent, it must bee cold by *Galen*'s owne rule, and it is not enough to say it hath warme parts in it, but being an vniforme substance, wee must determine of it *ex predominio*. Also *Galen lib. 1. Symp. cap. 4*. comparing pure water with sea water, scemes to affirme that sea water, before it haue receiued any great aduentitious cold, may coole our bodyes. And so this place is vnderstood by *Anthonijs Maria Venustus in consilio pro Petro Picardo*, The repelling quality, and the making an eschar, and the preseruing from putrifaction, are arguments of drinesse, and not of heat. For as heat and moysture are principall agents in generation and corruption; so cold and drinesse in preseruatiō. Also I should impute the purgatiue and deterforie qualities in salt rather to the tenuity of parts, and the stimulation which it hath from thence, then to any heat; for then as *Sennertus* saith, all hot things should purge; *Instit. lib. 5. part. 1. cap. 11. Valeriala in Gal. de constit. artis pag. 447*. And *Mesne Canon. universal. cap. 1*. reiects all elementary qualities, temperaments, similitudes, or

contrarieties

contrarieties of
Also Tamarind
purge, and yet a
gaine faculty of
expulsive facultie
attraction by
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contrarieties of substances, &c. in purging medicines. Also Tamarinds, Myrabolans, and Antimony doe purge, and yet are cold, *Venusius pag. 132*. But the purgative faculty of medicines is from stimulation of the expulsive faculty of the stomach and guts, and not from attraction by heat of peculiar humors, as hath beene imagined. Heat may serue as an instrument to actuate stimulation, as cold doth dull and benumbe all faculties, but neither heat nor cold are principall agents in this worke. And whereas Reubarb is thought to purge collic only, Sene and Polipody melancholy, Agarick phlegme, &c. because wee see the excrements tinged with the same colors, it is a deceit: for these purgations doe colour humors in that manner. Yet I doe not deny a distinction to be made of purgations in other respects. And our ancient Physitians through long experience haue found out the right vse of purging medicines, and their true distinctions for seuerall vses for mens bodies: as that some doe purge grosse humors, and some thin, some are strong, and some weak: some are comfortable to the stomach, or liuer, or spleen, &c. and some hurtfull to some of those parts: some are too hot in some cases, and some temperate, &c. But they haue not discovered the true cause of this purging quality: some attributing it to a celestiall influence, some to a hidden quality, which is as much as if they had said nothing: some to a Sympathy, Antipathy, &c. For my part I hold the purgative quality of mixt bodies to lie principally in the terrestriall part of them, which is their salt: and therefore the Chymists vse to acuate their purging extracts with their proper salts. It were much better if they could make their salts without calcination: for then they should retaine the tast of the Simples, which lyeth in the salt, and much

much other vertue which the fire consumes in calcination. And I am likewise of opinion, that as their purgative qualitie lyeth in the Salt, so it workes by Stimulation, a qualitie most proper to Salt, whereby it furthers all generations, &c.

*In pestis Alexic.
Dariot de
preparat. med.
Tract. 2. cap. 23.
24.*

Niter doth dry and attenuate more then salt, and although it hath not so much astringent as Salt is said to haue, yet it seemes to coole more then Salt, perhaps because it is of thinner parts, and penetrates more, and that is the reason that it serues better for the dissolution of Mettals. In physicke we finde our Sal nitrum (which is a kinde of it) to coole the body mightily, and therefore vsed in Iuleps: Allum and Vitriol are much alike, but that Vitriol hath a garbe from Copper or yron. These are very astringent, and without doubt cold, whatsoeuer hath beene held of them. The waters or phlegmes distilled from them doe exceedingly coole in Iuleps, as *Quercitan* and *Claudius Dariot* haue obserued, and we also by daily experience doe finde true: by reason of the intense aciditie they haue, being distilled from their Terrestriall parts. Also those *acidula* which the Germans call *Saurbrun*, proceeding from these iuyces, are much vsed to quench the heate of feuers. It may be objected, that they are Corrosiues, and will cate into mettall, and therefore must bee hot. But by the same reason, the iuyces of Limmons, Barberies, Howsleeke, &c. should be hot, for they will carue iron. To bite and cate as a Corrosiue, are not arguments of heate, but of piercing: Wherefore *Hippocrates* saith, *Frigus ulceribus mordax*, and *frigus est principium destructiuum, ut calor generativum*. And therefore it is more probable that these corrosiues are more cold then hot. These two minerall iuyces are not so readily dissolued in water, as the other two, and will be more easily precipitated by any

any opposite substance that is more familiar to water. I omit the severall sorts of these concrete iuyces and their admixtures with other minerals, as impertinent to my purpose : wherefore I will shew some examples of each of them in naturall Springs.

For salt Springs, *Iosephus a Costa* tels vs of a rare Spring at a farme neere Cusco in Peru, which as it runs, turnes into very white Salt, without any fire or Art, in great abundance. In Germany are many salt fountaines, at Luneburg, Stafford, Saltzburg, Aldondorg, Halstat, &c. In Italy, in *agro Volaterano*, &c. In Cicily, at Solinantia, is a salt Well which is hot; and so are the Pegasæi fonts in Caria. Also the fountaine by Medon in Træsen is both salt and hot. Our Wiches in Cheshire are well knowne. There are also Riwers of salt water by the Caspian streights, and in Spaine, and Caria, and in Bactria, Ochus and Oxus. Also there are salt Lakes, as the Tarentin Lakes in Italy, the Lake betweene Strapela and Seburg (mentioned before) In Germany three Lakes, in Cicily, and besides an infinite number in other Countries, the Lake of Lakes, the Sea. All which receiue their saltnesse from Mynes of salt in the earth, which are very frequent and huge in bignesse, as may appeare by the Rocks of Salt in Bohemia, in monte Carpato, in Polonia, within two miles of Cracouia, in Heluetia, and Rhetia, where they haue no other salt but from the Rocke. As also by the Caspian Straights, are great Rocks of Salt. But *Marcus Paulus Venetus*, tels vs of a Rocke or Mountaine of Salt in *Thaican*, able to furnish all the World with Salt. So that it is no maruaile that the Sea is salt, seeing it pierceth into the bowels of the earth, and discouereth many great Rockes of Salt which dissolue in it. And this is the true cause of the saltnesse of the Sea. And considering the

Lib. 3.

great vse of Salt, both for other vses, and for generati-
ons, nature hath provided enough of it, especially in
the Sea, which is more fruitfull in that respect, then the
Land. Wherefore *Venus* was called *Αλιγενή* : *Est Venus*
orta Mari.

Observat. l. 3:
c. 76, 77.

Lib. 5. c. 7.

Lib. 3 l. 1. 10.

Niter is seldome found in Bathes alone, but mixt with
other minerals, which it dissolues, and infects the wa-
ter withall. Yet we reade of a nitrous Lake called *Le-
tis*, neere *Calestria* in *Macedonia*, where they vse to
make Niter, and vent it to all parts. So they doe at the
Nitrarie in *Egypt*. Also the Lake *Arethusa* in *Armenia*,
is full of Niter. At *Menis* in *Phrygia* is a Spring of ni-
trous water which is hot: also in *Leonte* is a hot nitrous
Spring. *Bellonius* makes mention of a Nitrous fountaine
neere *Belba*, and of abundance of Niter vpon a Plaine
neere thereunto, which seemes to be that which *Pliny*
cals *Halmiraga*. But he denieth that there is any Mine
of Niter vnder the earth, but that all is bred out of the
Soyle as an *efflorescens* of the earth: *Baccius* saith the
same of Salt-Peter. *Agricola* saith, that as the true Ni-
ter is gathered vpon the Playnes of *Media* aboue the
earth, so is Salt-peter found aboue the earth in many
places of *Saxony*: That, Niter is gathered vpon the
Plaines of *Media*, are *Plinys* owne words. *Exiguum fit*
apud Medos canescentibus siccitate conuallibus. So that it
seemeth, his opinion was, that Niter is not bred in a
Myne vnder the earth, but in the earth it selfe, as the
chiefe fatnesse it hath to further generations. And see-
ing earth is the mother of all Terrestriall bodies, it is
not left vnfurnished with those minerall iuyces, nor
ought else that is requisite for the production of species:
It hath beene obserued by some, that nitrous water is
the best soyle for ground, and brings all Plants to per-
fection farre sooner then any other dung, and therefore
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the Egyptians w
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magh, as *T. hu*
at Mazaronne
wond, *Piamb*
cio Sieneſe rep
allum, as at G
Dorsetshire, a

the Egyptians water their Coleworts with Nitrous water, *Nitrosa viridis brassica fiet aqua*. Our Salt-peter *Martial*. men doe finde, that if any fat earth bee couered from raine and sun, so as it spendeth not his strength in producing of Hearbs or Grasse, it will breede plenty of Salt-peter, otherwise it will yeeld none. The difference betweene Salt-peter and the ancient Niter, appears in this, that a pound of Niter being burnt, will leaue foure ounces of ashes; Salt-peter will leaue none. Salt-peter is actually so cold, as being dissolued in water, it is vsed in Rome and Naples to coole their Wine, and doth it as well as yce or snow. Also we vse it inwardly in cooling Iuleps, and therefore it seemes also to bee potentially cold, as *Bellonius* iudgeth.

Now I come to Allum (*Indignum vox ipsa iubet renouare dolorem*) the greatest debtor I haue, and I the best benefactor to it, as shall appeare when I shall think fit to publish the Artifice thereof. In Illua, a myle from Rio, is an Allum fountaine: also there are diuers in Agro Senensi, Volaterano Lucensie, in Italy, *Balneum de villa* is full of Allum: and with vs in Shropshire at Okenyate, are Allum springs, whereof the Dyers of Shrewesburymake vse in stead of Allum. As for allum Mynes, they are frequent almost in all Countries, but the chiefeest that are wrought, are at Capsylar in Thracia, at Tolpha neere Ciuita Vectia in Italy, at Commatow by Auffig in Germany, and with vs in Yorkeeshire, In Ireland there haue beene Allum workes neere to Armagh, as *Thurmiser* reports: also at Metelin in Spayne. at Mazaron neere Garthage, at Hellespont, Massa, Montond, Piambin, Volterra, Campiglia, &c. as *Beringaccio Siense* reports. Also there are diuers earths yeelding *pyrotechnica* allum, as at Guyder in Carnaruanshire, at Camfurt in Dorsetshire, and in the Ile of Wyght. But I will contract
F 2 my

my selfe for Allum, and come to Vitriol.

Simp. med. facul.
l. 9. c. 61.

Libav. in Syntag.
3. part. l. 7.
Item, singulari
part. 1.

Lib. 3. Von.
Kupffer erz.

Vitriol, as I have said before, doth participate much with Allum in the manner of shooting or roching, which is *in glebas*, in the hard dissolution and easie congelation, in their arising in balls being burnt, and in their precipitation: in so much as it is probable, that the basis of Vitriol, is nothing but Allum. It is found in minerall waters of two sorts. The one, where the very body and substance is dissolved: as in Cyprus, which *Galen* describes, where the water is Greene: also at Smolnicium in Hungary, in Transilvania *ad Carpatum montem*, at Nensola, &c. In which places Copper is ordinarily made out of iron by infusing it in these waters. I will not determine whether this be transmutation of one species into another, as some doe hold, or rather a precipitation of the Copper which was formerly dissolved in the water by meanes of the sharpe Vitriol; which meeting with Iron, corrodes it, and imbibeth it, rather then the Copper, and so lets the Copper fall, and imbraceth the Iron in place of it. Wee daily see the like in Aqua fortis, which hauing imbibed one metall, will readily embrace another that is more familiar to it, and let fall the first. So Allum or Coppresse water hauing some strong Lixiuum of tartar or other calcind salt put to it, the Allum or Coppresse will presently fall to the bottome, and participate, and giue place to the Lixiuum, as a thing more familiar to water, and of more easie dissolution. But as I say, I will not determine this question, because it is not much pertinent to our businesse. Yet I will not omit the iudgement of *Lazarus Ercker* the Emperours chiefe Mine master in the Kingdome of Bohemia, who professeth that he was long of this opinion, but altered it vpon this reason, That by exact prooffe he found more

Copper

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these are in the
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ad Odram, &c
lum, but mild
vapour being
Vitriol, but son
Acidula are fr
Vitriol, or Su
ler datus to be
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appeare by eua
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ill then the vap
which is in Sul
fect last; and
sharper it arise
eth. Thus mu

Copper stricken downe this way by Iron, then the water before did containe, and with the Copper some Silver. The other kinde of Vitriol water is, where not the body and substance of Vitriol is dissolued, but the spirit, or vapour, or quality communicated to the water: of this sort are our Vitriol Baths for the most part. And these are in themselves wholesome, and are sowre, if the Vitriol be predominant. Such are most of our *Acidulae*; whereof we haue many in *Viterbio & Volaterano*, *Balnearum ad morbum dictum*, Saurbrun by Franckford, *ad Oderam*, &c. these are sowre waters. Also from Allum, but milder, also from Sulphur, whose spirit or vapour being burnt, is little differing from the spirit of Vitriol, but somewhat saltier. But the most part of our *Acidulae* are from Vitriol. This sowre spirit of Allum, Vitriol, or Sulphur, *Libavius* iudgeth with *Thomas Jordanus* to be in the terrestriall parts of these minerals, because it goes not away by boyling or distillation, and therefore to be communicated with water by the corporall substance or iuyce of them. But that holds not in minerall spirits which are heavier then water, as may appeare by euaporation of any water made sowre with spirit of Vitriol or Sulphur, where, after long euaporation, that which remaines will be more sowre then before euaporation. So it is also in Vinegar being a vegetable iuyce. The spirit of wine doth certainly arise first in distillation, and the first is the best, being more volatile then the vapour of water. But this *spiritus acetosus* which is in Sulphur, Allum, Vitriol, and Vinegar, ariseth last; and the more you distill away from, it the sharper it ariseth; and the sowrer is that which remaineth. Thus much for Vitriol and concrete iuyces.

10. Baubinus de
thermis l. 2. c. 2.

De iudicio aqu.
miner. p. 2. c. 36.

CAP. 8.

Of minerall spirits. Quicksilver, Sulphur or Brimstone, Arsenick, with his kindes; Cadmia.

A Fift kinde of mineralls are called spirits; these are volatil in the fire, and haue ingression into metals, but no metallin fusion. These are Quicksilver, Sulphur, Arsenick, Cadmia, Rusma, &c. All which being volatil will easily sublime, and being mixed with metals, as Cadmia is ordinarily to make Brasse, will alter the colour of the metall, and make it lesse fusible, and lesse malleable. I will briefly run over the examples of these and their virtues, or qualities, being more obscure and in our Bathes lesse vscfull then the former, and more rare.

Simpl. med. facult. l. 9. c. 59.

Vidus Vidius curat. generatim p. 2. sect. 2. l. 3. c. 13. Fallopius de metallis c. 37.

Quicksilver was not well knowne to *Galen*, for hee confesseth that hee had no experience of it, and did thinke it to be meerely artificiall, and not naturally bred in the earth. *Dioscorides* makes no mention of the temperature of it, but holds it to be a pernicious venome, and to fret the entrayles: although *Mathiolus* affirms that it is safely giuen to women to further their deliuerance, and we find it so by often experience, both in that cause, and in Wormes, and in the French Disease and Leprosies, if it be skilfully prepared, and with iudgement administred. *Fallopius* holds it to be one of the miracles of nature. Those that take vpon them to determine of the qualities of it, are much distracted; some reckoing it to be hot and dry, and some cold and moist; and both in a high degree. But in this account they consider not the qualities of the ingredients in the preparation; whether it be sublim'd or precipitated. For my part I know not how to reduce it to the Elementary qualities: neither

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ther am I ashamed of mine ignorance in it, seeing no man hitherto hath giuen true satisfaction herein. But for our owne vse where reason failes vs, let vs be guided by experience. VVe finde by experience, that it cuts, attenuates, penetrates, melts, resolues, purges both *ad centrum & à centro*, heats, cooles, &c, and is a transcendent beyond our rules of Philosophie, and a monster in nature, as *Renodæus* saith. For our purpose it is enough to know whether it will impart any qualitie to water; which *Fallopins*, *Baccius*, *Solinander*, *Bauhinus*, and *Felix Platerus* doe acknowledge. But it giues no taste to it, neither haue we many examples of Baths which containe it. In Serra Morena in Spaine, neare the village Almedien is a Caue, where are many Wels, infected (as is thought) with Quicksiluer, because much of that minerall is extracted from thence, out of a red stone called *Minium nativum*. About fifty miles from thence in Valentiola there is another fountaine called La Naua, of a sharpe taste, and held to proceede from Quicksiluer, and these waters are found wholsome. So are the waters at Almagra and Toletum, and others by the riuer Minius, which are hot. There are many venomous springs attributed to Quicksiluer, as the red fountaine in Ethiopia, others in Boetia, Cæa in Trogloditis, Stix in Archadia, Stix in Thessalia, Licus in Sicilia, &c: which perhaps are from other mineralls, seeing wee finde some from Quicksiluer to be wholsome. For mines of Quicksiluer, we read of many in Bætica, Attica, Ionia, out of a stone which *Pliny* calls *vomica liquoris æterni*. In Germany at Landsberg, at Creucenachum, Schenbach, Beraun aboue Prage Kunningstien, &c. In Scotland, three miles beyond Barwicke, I found a red stone, which I take to be *minium nativum*, seeing *Agricola* makes mention of it in Scotland, but by a mischance could not try it.

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Sulphur attracts, contracts, resolves, mollifies, diffuses, whereby it shewes a manifest heate, though not intense, yet the fume of it is very soure, and therefore must coole and dry: and I perswade my selfe that there is no better fume to correct venomous and infectious ayre, then this of Sulphur, or to remoue infections out of roomes, clothes, bedding, vessels, &c. We must acknowledge parts in all compounded bodies; as Rubarb hath a purgatiue qualitie in the infusion, and an astringent in the Terrestriall substance, where the salt hath beene by infusion extracted. The substance of Sulphur is very fat (*Sulphure nihil pinguius*) saith *Felix Platerus* and this is the cause of his easie taking of fire, and not any propinquitie it hath with fire in the qualitie of heate: for if it were very hot, *Dioscorides* would not commend it *purulenta extusiscentibus*, the next dore to a Hectick. Also *Galen* saith, that fat things are moderately hot, and are rather nutriments then medicaments. Now for Sulphurous Bathes, they are very frequent, and if we should beleue some, there are no hot Bathes, but participate with Sulphur, but they are deceiued, as shall appeare hereafter, when we come to shew the true causes of the heate of Bathes. Neither are all sulphurous Bathes hot. *Gesner* reports of a Bath by Zurich, very cold, and yet sulphurous. *Agricola* of another by Buda in Pannonia. In Campania by the Leucogæan hills, are cold Springs full of Brimstone. Also there are hot Bathes without any shew of sulphur that can be discerned, as the Bathes of Petriolum in Italy, the Bathes *Caldanellæ* and *de Auinione in agro Senensi de Gratta in Viterbiensi, de aquis in pisanis collibus, Divi Iohannis in agro Lucensi in Alsatia*; another not farre from *Gebersallerum*, &c. All which are very hot, and yet giue no signe of Sulphur either by taste, or smell, or effects. And yet

yet no doubt there are many Baths hauing a Sulphurous smell from other minerals; as from Bitumen, Vitriol, Sandaracha, Allum, &c. which are hardly to be discerned (if at all) from Sulphur: So we commonly say, if a house or a tree bee set on fire by lightning, that it smells of Brimstone, when there was no Brimstone there. Many things combusted will yeeld a Nitrous smell, not discernable after burning, what the things were. But there are diuers truly Sulphurous Baths which containe Sulphur, although not perfectly mixt with the water without some *medium*, but only confused: for perfect Sulphur will not dissolue in water, no more then Bitumen. The spirit of Sulphur may be communicated to water, and so may the matter of Sulphur before it hath attained his perfect forme and consistence: otherwise it is only confused with water, and alters it into a milky colour. *Sulphurea hac albus aqua*. At Baia are diuers hot Sulphurous Baths, and euery where in Hetruria; in Sicily, in *Diocesi Panormitana*; the Baths of Apono, as *Sauanarola Muntagnana*, and *Fallopis* auers, although *Iohn de Dondis* denieth it; the Bath of Astrunum, of Callatura, S. Euphemie, Aquisgran, *Brigensis therma in Valesijs Helvetiorum*, *aqua sancta in Picenis*, and an infinite number euery where. *Baccius* receiues our Baths of Bathe among Sulphurous Baths, from the relation of *Edward Carne* when hee was Embassadour to *Iulius tertius*, and *Paulus quartus*. I will not deny some touch of Sulphur in them, seeing wee finde among Bitumeous coales, some which are called metall coales, with certaine yellow vaines which are Sulphur. But the proportion of Sulphur to Bitumen, is very little, and therefore I doe not hold them Sulphurous *à predominio*. This is enough for Sulphur.

Concerning Arsenick, it is a venomous minerall, and
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therefore I neede speake nothing of the Bathes which proceede from it, but that wee take heed of them; It is likely that those venomous waters and vapours which kill suddenly, doe proceede from Arsenicke, as at Cicrum in Thracia *fons Neptunius in Terracina*, at Peraut by Mompelier, *the Lake Auernus*. *The caue of Charon by Naples*. Vnder Arsenicke wee may comprehend Auripigmentum, Risagalum, Sandaracha, Rusma, &c. I heare of but one Mine of Rusma in Ciprus, from whence the Turkes haue it to take off hayre, and it doth it best of any thing knowne, as *Bellonius* and *Platerus* reports, and I haue made triall of it oftentimes: The former sorts of Arsenicke are found in *Misia Hellesponti in Ponto*, by the Riuer Hippanis, which is made bitter by it. In the lesser Asia, betweene Magnesia and Euphesus in Carmania, &c. It is accounted to be extreame hot and putrefying.

Cadmia is either naturall or factitious: The naturall is often dangerous in Germany, as *Agricola* saith, especially that which is liquid, which is a strong corrosiue: the other is of the nature of Copper, moderately hot and clensing, and especially good to cleere the eyes, as *Calaminaris* and *Tutia*. It is found in Copper Mynes, and of it selfe in Cyprus, as *Gallen* saith by the Citie Solos. Also in *Agro senensi, vicentino, Bergamensi*, neere Como, where they make Brasse with it. Vnder Mendip hils there is much of it. The Bathes of Saint *Cassian* doe participate with it, and *Cicero* his Bathes neere Baia. Also the Bath at Zurich in Heluetia, and Grotta in Viterbio.

Thus much for Spirits.

GAP.

CAP. 9.

Of meane metals, or halfe metals: *Bismutum* or *Tinglasse*. *Antimony*. *Bell-metall*.

ASixt fort I make to be meane metals, or halfe metals, which are minerall substances, hauing metalin fusion, but are not malleable as metals are: and therefore being mixt with metals, doe make them brittle. These are *Bismutum*, or *plumbum cinereum*, *Anthimony*, *Bell-metall*, which *Gaber* calls *Magnesia*, in dutch, *Speiſſ*. *Calacm* also may be reckoned among those, which is a kinde of white metalin *Cadmia*, brought out of the East Indyces, which hath both metallin ingression, and metallin fusion, but not perfectly malleable. These although they are more volatill then metall, yet by reason of their fusion into a King, are not so easily sublimed as the Spirits.

Bismutum is that wee call *Tinglasse*, differing both from Tin and Leade. *Candidius nigro, sed plumbo nigrius albo*. It was not knowne to the Ancients, and therefore we can say little of the qualities of it. It is found in England, and in Misnia, and at *Sneberg* in Germany, and in very few places else. I reade not of any waters that participate with it: neither can I say much of *Antimony*, but that *Dioscorides* saith it cooles, bindes, opens obstructions, &c. And *Gallen*, that it dryeth and bindeth, and is good for the eyes, &c. But of the purging qualitie they write nothing, although wee finde it to purge violently, both vpwards and downewards: whereupon wee may gather that all purging medicines are not hot, as I haue touched before. *Camden* saith there is a Mine of it in *Cumberland*: It is found in Italy, in *Thinni montibus*, in *Senensi agro* in the Countie of

S. Flora, and in Germany in many places. But I reade of no waters that participate with it, vnlesse wee should iudge all purgatiue waters to be infected with it: as neere Ormus, *Purchas* writes of such a Spring which purgeth.

parte 3 pag. 72. Sauonarola in Balneis Romandiole, mentions a Spring at Meldula, which purgeth. Also *Balneum Tertutij in agro Pistoriensi, Fallopio*; also the sowre water of Mendich and Ponterbon doe purge choler, as *Rulandus* saith. At Nonesuch we haue also a purgatiue Spring, which may participate with Antimony or Niter, or both: But purgatiue waters are rare, vnlesse it be *ratione ponderis*, by the weight and quantity, and so any water may purge, and our Bath waters doe purge in that manner, and by the addition of Salt, which giues stimulation vnto it. This our Bath guides doe ordinarily prescribe to such as will be perswaded by them, not knowing how it agreeth with their griefes, nor how it may doe hurt in many respects, as oftentimes it doth.

Bell-metall is thought to be a mixture of Tinne and Copper Oares, as *Kentman* iudgeth, and is found in our Tinne and Copper Mynes in Cornewall. I reade of no waters infected with it, nor of any vse it hath in Physicke.

CAP. IO.

Of metals. Gold. Siluer. Iron. Copper. Tinne. Leade.

*Fallop. de metallis cap. 10.
Liban. de nat. metall. pars 3.
cap. 5.*

THE seuenth and last sort are metals, minerall substances, fusible and malleable. These are commonly distinguished into perfect and imperfect; perfect, because they haue lesse impuritie or heterogeneitie in them, as gold & Siluer. The rest are called imperfect, because they are

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are full of impurities, and they are either hard or soft. Hard, as those which will indure ignition before they melt, as yron and Copper. Soft, which will not, but melt at the first, as Tinne and Lead.

Gold of all metals is the most solid, and therefore the most heauie, as hauing no impurities or heterogeneall substances mixed with it. And therefore it is not subiect to corruption, as other metals are, neither will it loose any of his substance, either by fire or water, although it should be held in them a long time: so as it is an idle and vaine perswasion that many haue, who thinke by boyling Gold in broth, to get some strength from thence, and so to make the brothes more cordiall. The like I may say of putting Gold into Electuaries or Pils, vnlesse it be in case of Quicksiluer taken into the body, which the Gold by touch may gather to it, otherwise it goes out of the body as it came in, without any concoction or alteration, or diminution. And if it bee dissolued in strong water, it will be reduced againe to his metallin substance, without diminution, much lesse will it be dissolued without corrosiue Spirits, to make *aurum potable*, as some doe vndertake. *Crollius* doth acknowledge, that there is but one *Menstruum* in the world that may doe it, and that he knowes not. But if we had it dissolued, we are yet vncertaine what the quality of it would be, or what vse to make of it in Physicke; onely because it looseth none of his substance, we know it can doe no hurt, and therefore we vse it for Cautories, and to quench it in Beere or Wine, &c. to warme it, or to giue it some astringtion from the fire. *Fallopins* in these regards disclaymes it in all minerall waters, as hee doth all other metals: and will not beleue that any metall doth impart any qualitic vnto water. *Claudius* holds otherwise, and so doth *Baccius*, *Sauonarola*, *Montagnana*,

*Baccius lib. 6.
cap. 8.*

*Basilica chimica
pag. 204.*

*De Thermis
cap. 8.*

*In ingressu ad
infirmitates,
pag. 373.*

Venustus Solinander, and almost all that haue written of Bathes. For if we should exclude Metals, wee must likewise exclude Stones, and Bitumina and Sulpher, and almost all minerals, except concrete iuyces. For none of these, after they haue attayned to their full consistence, will of themselues dissolue in water, without the helpe of some concrete iuyce, as a medium to vnite them with the water. But before they haue their full consistence, whilst they are in *Solutis principijs*, as Earth, Iuyce, or Vapour, they may be communicated with water. Gold is so sparingly bred in the bowels of the earth, as in that respect it can hardly furnish a perpetuall Spring with any quality from it; yet some Bathes are held to participate with Gold, as *Ficuncellenses*, *Fabaria*, *Piperina*, de *Grotta in Viterbio*: *Sancti Cassiani de Buxo*, &c.

Theod. Tabernimontanus. p. 2.
cap 49.

Siluer comes next in puritie to Gold, but is inferiour vnto it, as appeares by the dissolution of it, and by the blew tincture which it yeelds, and by the fouling of the fingers, &c. For the qualities of it, there is not much discovered. But as all other things of pryce are superstitiously accounted cordiall, so is this, especially in hot and moyst distempers of the heart: for it is esteemed to bee cold, and dry, and astringent, and yet emollient. Wee haue no Bathes which doe manifestly participate with it: perhaps, by reason, nature doth not produce it in sufficient quantitie to infect waters. *Iohn Bauhinus* thinkes there may be Siluer in the Bathes at Boll: because hee saith there was a Pyritis or Marchesit examined by Doctor *Cadner*, and out of fiftie pound weight of it, hee drew two drams of siluer: a very small proportion to ground his opinion vpon:

Iron is the most impure of all metals, as we haue it wrought, and will hardly melt as metals should doe, but with additaments and flusses. Neither is it so malleable, and

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and ductible as other metals are, by reason of his many impurities. Yet we see that at Damasco they worke and refine it in such sort, at it will melt at a Lampe, and is so tough, as it will hardly breake. And this is not by reason of any especiall Myne differing from other iron Mynes, for they haue no Mynes of yron neere to Damascus, as *Bellonius* reports, but haue it brought thither from diuers other places, onely their art in working and purifying it, is beyond ours. So the Spanish Steele and iron is purer then ours, and wee doe esteeme of Bilbo blades beyond others which are quenched in the Riuer Bilbilis: as *Turnus* his Sword in *Virgill* was quenched in the Riuer Styx.

*Ensem quem Dauno ignipotens Deus ipse parenti
Fecerat, Stygia candentem extinxerat unda.* *Ænead. 12.*

But the hardning of Steele lyeth not in this point; other waters no doubt may serue as well. But I perswade my selfe that our iron might be made much purer, and perhaps some gold extracted from it which it holds.

Concerning the temperature of Iron and Steele, *Galenus* reckons it among earth, and therefore it must bee cold. *Manardus* is absolutely of that opinion, and so are most of our Physitians. Only *Fallopins* holds it to be hot, because *Scribonius Largus* prescribes it in vltcers of the bladder, which it doth cure, not in regard of heating, but drying; for it dryeth and bindeth much, and therefore by *Galens* rule it must bee cold. *Astringentia omnia frigida*. I haue obserued in Iron and Steele two distinct qualities, The one opening, or depilatiue; the other astringent. The opening quality lyeth in a volatill Salt or Niter, which it is full of, the astringent qualitie in the Crocus, or Terrestriall part. These two substances are thus discerned and seuered.

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Take of the fyings of Steele or Iron, and cast it into the flame of a candle, and you shall see it to burne like Saltpeter or Rosin. Take these fyings, and infuse them three or foure times in Water or Wine, as wee vse to make our Chalibert Wines, till the water or wine haue dissolved all this salt, and then dry it and cast it into the flame, and it shall not burne, but the liquor will haue a strong taste from this Salt. And this is it which opens obstructions. The astringent qualitie lyeth in the Terrestriall substance, as is euident, after either, by infusions, or by calcination, the volutill salt is departed from it, that which remaines, is very astringent, and stayeth all manner of fluxes, &c.

Solinander,
pag. 193:
Venusius, pag.
159.
Baccius lib. 6.
cap. 3.
Sauonarola:
Renodeus pag.
306.

Concerning Bathes participating with Iron, we haue too many examples of them for *Fallopins* to contradict. We may let him inioy his opinion of the *Galderiana*, *Veronensia* & *Villensia Lucensia*, although it bee against the iudgement of all other who haue written of them, and it is hard for him to be confident in a negatiue. Wee haue examples more then enough to proue the qualitie of Iron in our minerall waters. *Balneum Reginae in agro Pisano*, is actually hot, and from iron. So is *Balneum Sancti Cassiani in agro Senensi*: So in *Balneum Ficuncella, de Russellis, Bora in agro Florent*. *Brandula in agro Regiensi, Vesicatoria in Tuscia, Isenbrun* by Leige, *Forgense in Normandy*: the Spa water, *Tunbridge water*: *Bristoll water* by *S. Vincents* *Rocke*: all which, some being hot, and some cold, participate with Iron, as may be proued, not onely by the consent of all writers, which haue made mention of them, but by the Mynes from whence they come, or by their taste, or by their vertues.

Copper comes neereſt to the nature of Iron, but is more pure, and more easie of fusion, and will be almost all

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all conuerted into Vitrioll. They are conuertible the one into the other, as I haue shewed out of *Erker*, in Vi Libav. de nat. metall. c. 10. trioll. And by the practise at Commataw and Smolnium. The like also hath beene shewed in Cornewall, at the Confluence by Master *Russell*. *Aristotle* also tels of a Copper Myne in Thalia, an Iland of the Tyrrhen Sea, which being wrought out, turned to an iron Myne: in this similitude of nature, we cannot but iudge that there is a similitude in qualities, and that Iron being cold, Copper cannot be hot. Teniperate it may be, because lesse astringent then Iron, and more clensing: *Rhasis* saith that it purgeth like a Catharticum, and in his Continent, prescribes it to purge water in dropsies. Another argument that all purgatiues are not hot; It drieth exceedingly, and attenuates and digests. We haue diuers waters which participate with it, which if they be pure from Copper it selfe, are very safe and wholesome: but if they be foule, and proceede from the excrements of Copper, they are not wholesome to drinke. *Balnea Cellensia seu ferina in Martiana Silua*, doe consist of Copper and Allum. The Bath of Fabaria in Rhetia, of Copper and Gold. *Aqua de Grotta in agro Viterbiensi* is full of Copper; so is *Aqua Iasielli*, *Balneum Leucense in Valesijs*: *Marcus Paulus Venetus*, tels of a greenish fountaine in Persia, which purgeth exceedingly, and is held to come from Copper.

Tinne and Lead are two of our Staple commodities which our Countrie yeelds plentifully, not onely for our owne vse, but to supply other Nations. Tinne is bred in Cornwall, and part of Deuonshire, and in the Isles of Silly, which from thence were called *Cassiterides*. It is melted out of little blacke stones, which the Dutch call *Zwitter*, with great charge, because they cannot melt it, but with wood coales, which is brought them farre off,

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and they are saine to runne it ouer two or three times, before they can get out all the Tinne, and yet much of it is wasted in the blast. I doubt not but it might bee done with Sea-Coale, if they knew the Artifice, and with a great product of Tinne. There is both siluer and gold found in it, but without wasting of the Tinne, wee know no meanes to seuer it. It is in qualitie cold and dry, and yet moues sweat abundantly, as I haue proued.

Lead is melted commonly out of an Ore common to Siluer and Lead, as *Pliny* saith, called *Galena*. And although *Agricola* saith of the villachar Lead, that it holds no Siluer, and therefore fittest for assayes; yet *Lazarus Ercker* contradicts it out of his owne experience. Our Countrie abounds with it euery where, especially at the Peake in Darbeshire, and at Mendip in Sommersetshire; Wales also and Cornwall, and Deuon, are full of it, and so is Yorkeeshire and Cumberland. The qualities of it are cold and dry. But for these two metals, wee finde no waters which are infected with them. In Lorayne, they haue Bathes called *Plumbaria*, which some thinke by reason of the name, to proceede from Lead: but *John Bauhinus* thinks they should bee called *plumiers*, as *Pictorius* writes it from the French word *plumer*, à *de-plumando*, because they are so hot, as they vse to scald fowles in them, to take off their feathers.

Fig. 90.

Thus much for metals, and all other sorts of Minerals, with their seuerall Natures and Bathes infected with any of them. As for mixed Bodies, and flores, and recrements, &c. they are to be referred to the simple bodies from whence they proceede: As *Tutia*, *Pompholix*: *Minium*, *Cerussa*, *Sublimatum*, *Precipitatum*, &c.

CAP.

CAP. II.

Of the generation of metals in the earth. Their seminary spirit, matter.

NOW I must shew the generation of these minerals in the bowels of the earth, which of necessity wee must vnderstand, before wee can shew the reasons how minerall waters receiue either their actuell heat, or their

*Fallop. de metallis cap. 11.
Libanius de nat. metal. cap. 12.*

vertues. Some haue imagined that metals and minerals were created perfect at the first, seeing there appeares not any seede of them manifestly, as doth of Animals and Vegetables; and seeing their substances are not so fluxible, but more firme and permanent. But as they are subiect to corruption in time, by reason of many impurities, and differing parts in them, so they had need to be repaired by generation.

It appeares in *Genesis*, that Plants were not created perfect at first, but onely in their Seminaries: for *Moses*, Cap. 2: giues a reason why Plants were not come forth of the earth, *scil.* because (as *Tremellius* translates it) there had as yet neither any raine fallen, nor any dew ascended from the earth, whereby they might be produced and nourished: The like we may iudge of minerals, that they were not at first created perfect, but disposed of in such sort, as they should perpetuate themselves in their seuerall kindes. Wherefore it hath euer beene a receiued *Axiome*, among the best Philosophers, that minerals are generated, and experience hath confirmed it in all kindes. Our Salt-peter men finde that when they haue extracted Salt-peter out of a floore of earth one yeare, within three or foure yeares after, they finde more Salt-peter generated there, and doe worke it

ouer againe. The like is obserued in Allum and Coperosse.

And for metals, our Tinnners in Cornewall haue experience of Pitts which haue beene filled vp with earth after they haue wrought out all the Tinne they could finde in them; and within thirty yeares they haue opened them againe, and found more Tinne generated. The like hath beene obserued in Iron, as *Gaudentinus Merula* reports of *Ilua*, an Iland in the Adriaticke Sea, vnder the Venetians, where the Iron breeds continually as fast as they can worke it, which is confirmed also by *Agricola* and *Baccius*: and by *Virgill* who saith of it, *Ilua inexhaustis Chalybum generosa metallis*. The like we reade of at Saga in *Lygijs*, where they dig ouer their Iron Mynes euery tenth yeare. *Iohn Matheſius* giues vs examples, almost of all sorts of minerals and metals, which he hath obserued to grow and regenerate. The like examples you may finde in *Leonardus Thurneſius*. *Erastus* affirmes that hee did see in *S. Ioachims dale*, siluer growne vpon a beame of wood, which was placed in the pit to support the workes: and when it was rotten, the workemen comming to set new timber in the place, found the siluer sticking to the old beame. Also he reports that in Germany, there hath beene vnripe and vnconcocted siluer found in Mynes, which the best workemen affirmed, would become perfect siluer in thirty yeares. The like *Modestinus Fachius*, and *Matheſius* affirme of vnripe and liquid siluer; which when the workemen finde, they vse to say *Wee are come too soone*. But I neede not produce any more proofes for this purpose, as I could out of *Agricola* and *Libanius*, and others, seeing our best Philosophers, both ancient and moderne, doe acknowledge that all minerals are generated. The manner of generation of minerals and metals, is the same

Lib. 3. c. 19.

In Sarept. conci.
3. 11. &c.

In Alchimia
magna.
De metallis pag.
17. & 19.

Sebast. Foxius
l. 3. c. 6.
Seuerinus c. 8.
p. 125.]

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same in all, as is agreed vpon both by *Plato* and *Aristotle*, and *Theophrastus*: the difference is in the efficient, and in the matter.

For the manner of generation of minerals, although it be alike in all, yet it differs from the generation of animate bodies, whether animals or vegetables, in this, that hauing no seede, they haue no power or instinct of producing other indiuiduals, but haue their species perpetuated *per virtutem seu spiritum semini analogum*, by a spirituall substance proportionable to seede, which is not resident in euery indiuiduall, as it is in animals and Plants, but in their proper wombes. This is the iudgement of *Petrus Senerinus*, howsoever hee doth obscure it by his Platonick grandiloquence. And as there is not *Vacuum in Corporibus*, so much lesse in *Speciebus*. For that the Species are perpetuated by new generations, is most certaine, and proued before: that it is not out of the seedes of indiuiduals, is euident by this, that if minerals doe not assimilate nourishment by attraction, retention, concoction, expulsion, &c. for the maintenance of their owne indiuiduall bodies, much lesse are they able to breede a superfluitie of nourishment for seede. And how can they attract and concoct nourishment, and expell excrements, which haue no vaines nor fibres, nor any distinct parts to performe these Offices withall? Moreouer they are not increased as Plants are, by nourishment, whereas the parts already generated, are extended in all proportions by the ingression of nutriment, which fills and enlarges them: but onely are augmented externally vpon the superficies, by superaddition of new matter concocted by the same vertue and spirit, into the same Species.

The matter whereof Minerals are bred, is much controuerted, *Aristotle* makes the humidity of water and

*Casparinus de
metal. l. 1. c. 2.*

Cap. 2.

*Eras. disput.
part. 2. p. 262.*

Erastus, Caverius,
Cesalpinius,
Martinus,
Morestinus,
Foxius, Magy-
rus, Libavius.

3 Meteor. c. ult.
Cesalp. l. 3. c. 1.

Libav. de nat.
metall c. 14.
Caverius 178.

Septal. in Hipp.
de aere, aqu. & c.

the drynesse of earth to bee the matter of all Minerals: the drynesse of earth to participate with fire, and the humidity of water with ayre, as Zabarella interprets it; so that to make a perfect mixt body, the foure Elements doe concur: and to make the mixture more perfect, these must be resolved into vapour or exhalation by the heat of fire, or influence from the Sunne and other Planets, as the efficient cause of their generation: but the cause of their congelation to bee cold in such bodies as heat will resolve. This vapour consisting partly of moisture, and partly of drynesse, if all the moisture be spent, turnes to earth or salt, or concrete iuyces, which dissolve in moisture: if some moisture remaine before congelation, then it turnes to stone: if this dry exhalation be vinctuous, and fat, and combustible, then Bitumen, and Sulphur, and Orpiment are bred of it: if it be dry and incombustible, then concrete iuyces, &c. But if moisture doe abound in this vapour, then metals are generated which are fusible and malleable. And for the perfecting of these generations, this exhalation is not sufficient, but to giue them their due consistence, there must be the helpe of cold from Rocks in the earth to congeale this exhalation. So that here must be two efficientes, heat and cold. And for the better effecting of this, these exhalations doe insinuate themselves into stones, in the forme of dew or frost, that is, in little graines; but differing from dew and frost in this, that these are generated after that the vapour is converted to water; whereas Minerals are generated before this conversion into water. But there is doubt to be made of frost, because that is bred before the conversion of the exhalation into water, as may appeare, *Meteor. 1.* According to this assertion there must be two places for the generation of minerals: the one a
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matrix, where they receiue their essence by heat in forme of an exhalation, and from thence they are sent to a second place to receiue their congelation by the coldnesse of Rocks : and from this *matrix* come our minerall waters, and not from the place of congelation.

This is the generation of minerals, according to *Aristotle* ; but it is not so cleare, but that it leaues many scruples, both concerning the matter, and the efficient. For the matter, it seemes not probable, that water and earth should make any thing but mudde and dirt ; for you can expect no more from any thing then is in it, the one is cold and dry, the other cold and moyst ; and therefore as fit to be the matter of any other thing, as of particular mineralls. And water, whereof principally metals are made to consist, is very vnfit to make a malleable and extentible substance, especially being congeled by cold, as we may see in yce. But some doe adde a minerall quality to these materials, and that simple water is not the chiefe matter of metals, but such as hath imbibed some minerall quality, and so is altered from the nature of pure water. This assertion doth presuppose mineralls in the earth before they were bred : otherwise what should breed them at the first, when there was no minerall quality to be imparted to water ? Againe, this minerall quality either giues the water or the vapour of it the essence of the minerall, and then it is not the effect of water, but of the minerall quality, or the potentiall faculty to breed it. If the essence, then this metallin water, or vapour, must haue the forme of the metall, and so be fusible and malleable. If it haue only the power and potentiall faculty, then the generation is not perfected, but must expect further concoction. This concoction is said to be partly by heat, and partly by

*Valefius sacra
philosoph. c. 49.*

by cold; if by heat, it must be in the passages of the exhalation as it is carried in the bowels of the earth: for, afterwards when the exhalation is settled in the stones, the heat is gone. Now if the concoction bee perfected before the exhalation be insinuated into the Stones, as it must be, if it be like dew, then is it perfect metall, and neither is able to penetrate the Stones, nor hath any neede of the cold of them to perfect the generation. If by cold, it is strange that cold should be made the principall agent in the generation of metals, which generates nothing; neither can heate be the efficient of these generations. Simple qualities can haue but simple effects, as heate can but make hot, cold can but coole, &c. But they say cold doth congeale metals, because heate doth dissolue them; I answer, that the rule is true, if it bee rightly applied: as wee see yce which is congealed by cold, is readily dissolued by heate. But the fusion of metals cannot properly bee called a dissolution by heate, because it is neither reduced to water or vapour, as it was before the congelation by cold, nor is it permanent in that kinde of dissolution, although after fusion it should be kept in a greater heat then cold could be which congealed it. For the cold in the bowels of the earth cannot be so great, as it is vpon the superficies of the earth, seeing it was neuer obserued that there was any yce bred there. Wherefore this dissolution which is by fusion, tends not to the destruction of the metal (but doth rather make it more perfect) as it should doe according to the former rule rightly applied. And therefore this dissolution by fusion, doth not argue a congelation by cold: which being in the passiue elements, doth rather attend the matter then the efficient of generations: for it is apt to dull and hebetat all faculties and motions in nature, and so to hinder generations, rather then to further

further any. It is heate and moyfture that further generations, as *Ouid* faith, *Quippe ubi temperiem fumpfere humorque calorque, Conciunt.*

And thus much for *Aristotles* generation of minerals, where his vapours or exhalations doe rather ferue for the collection or congregation of matter in the Mynes, then for the generation of them; as *Libanius* Singularium lib. 1. part. 1 doth rightly iudge: *Agricola* makes the matter of minerals to be *Succus Lapidescens Metallificus*, &c. and with more reason, because they are found liquid in the earth: *Gilgill* would haue it Ashes; *Democritus* Lyme: but these two being artificiall matters, are no where found in the earth. The Alchymists make Sulphur and Mercurie the matter of metals: *Libanius*, Sulphur De nat. metal. cap. 10. and Vitrioll. But I will not stand vpon discourfing of these materials, because it makes little to my purpose. It is enough for my purpose to shew the manner of these generations, which I take to be this.

There is a Seminarie Spirit of all minerals 'in the bowels of the earth, which meeting with conuenient matter and adiuuant causes, is not idle, but doth proceed to produce minerals, according to the nature of it, and the matter which it meetes withall: which matter it workes vpon like a ferment, and by his motion procures an actuall heate, as an instrument to further his worke; which actuall heate is increased by the fermentation of the matter. The like we see in making of malt, where the graynes of Barley being moystened with water, the generatiue Spirit in them, is dilated, and put in action; and the superfluitie of water, being remoued, which might choake it, and the Barley laid vp in heapes; the Seedes gather heat, which is increased by the contiguitie of many graines lying one vpon another. In this worke natures intent is to produce moe indiuiduals,

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according to the nature of the Seede, and therefore it shootes forth in spyres: but the Artift abuses the intention of nature, and conuerts it to his end, that is, to increase the spirits of his Malt. The like we finde in minerall substances, where this spirit or ferment is resident, as in Allum and Copperos mynes, which being broken, exposed and moystened, will gather an actuall heate, and produce much more of those minerals, then else the myne would yeeld: As *Agricola* and *Thurneiser* doe affirme, and is proued by common experience. The like is generally obserued in Mynes, as *Agricola*, *Erastus*, *Libanius*, &c. doe auouch out of the daily experience of minerall men, who affirme, that in most places, they finde their Mynes so hot, as they can hardly touch them: although it is likely that where they worke for perfect minerals, the heate which was in fermentation, whilst they were yet breeding, is now much abated: the minerals being now growne to their perfection. And for this heate wee neede not call for the helpe of the Sunne, which a little cloude will take away from vs, much more the body of the earth, and Rocks; nor for subterraneall fire: this imbred heate is sufficient, as may appeare also by the Mynes of Tinglasse, which being digged, and laid in the moyst ayre, will become very hot. So Antimony and Sublimat being mixed together, will grow so hot as they are not to be touched: If this be so in little quantities, it is likely to bee much more in great quantities and huge rockes. Heate of it selfe differs not in kinde, but onely in degree, and therefore is inclined no more to one Species, then to another, but as it doth attend and serue a more worthy and superiour faculty, such as this generatiue spirit is. And this spirit doth conuert any apt matter it meetes withall to his owne Species, by the helpe of heate; and the earth is full

Carterius p 217.

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full of such matter which attends vpon the Species of things : and oftentimes for want of fit opportunitie and adiuuant causes, lyes idle, without producing any Species: but is apt to be transmuted by any mechanickall and generatiue spirit into them. And this matter is not the Elements themselues, but subterraneall Seeds placed in the Elements, which not being able to liue to themselues, doe liue vnto others. This seminarie Spirit is acknowledged by most of *Aristotles* interpreters, (and *Morissinus* calls it *Elphesteria*) not knowing how otherwise to attribute these generations to the Elements. And this is the cause why some places yeeld some one minerall species aboue another. *Quippe solo natura subest. Non omnis fert omnia tellus.* The seminary Spirit hath his proper wombs where it resides, and formes his Species according to his Nature, and to the aptnesse of his matter. But as *Seuerinus* affirmes of animall seedes, that they are in themselues *Hermaphroditicall*, and neither masculine nor feminine, but as they meete with superuenient causes, so it is in these minerall Seedes and Species, which in one wombe doe beget diuers sorts of minerals, either according to the aptnesse of the matter, or the vigour of the Spirits. Thus much for the generation of minerals, &c.

Foxius, Martinus, Moresinus, Magyrus, Libavius, Velcurio, Valesius, Carerius, Erasmus, Severinus.

CAP. IO.

Of the causes of actuall heat, and medicinable virtue in minerall waters. Diuers opinions of others, rejected.

NOW I come to shew how our minerall waters receiue both their actuall heat, and their virtues. I

ioyne them together, because they depend vpon one and the same cause, vnlesse they bee iuyces which will readily dissolue in water, without the helpe of heat : other minerals will not, or very hardly.

This actuall heat of waters haue troubled all those that haue written of them, and many opinions haue beene held of the causes of them.

Some attribute it to wind, or ayre, or exhalations included in the bowels of the earth, which either by their owne nature, or by their violent motion, and agitation, and attrition vpon rocks and narrow passages, doe gather heat, and impart it to our waters. Of their owne nature these exhalations cannot bee so hot, as to make our water hot, especially seeing in their passage among cold rocks, it would bee much alaied, hauing no supply of heat to maintaine it. Moreover, where water hath passage to get forth to the superficies of the earth, there these exhalations and winds will easily passe, and so their heat gone withall, and so our waters left to their naturall coldnesse : whereas wee see they doe continue in the same degree and tenor, many generations together. If by their agitation and violent motion they get this heat, because no violent thing is perpetuall or constant: this cannot be the cause of the perpetuall and constant heat of water. Besides, this would rather cause earthquakes and stormes, and noyses in the earth, then heat our springs. Moreover, wee dayly obserue that water is neuer heated by winds, or agitation ; as in the Cataracts of the Rhein by Splug ; the agitation and fall of water vpon rocks is most violent, and makes a hydeous noyse ; yet it heats not the water, though it be very deepe in the earth. Neither can any attrition heat either ayre, or water, or any soft, and liquid thing, but rather make it more cold.

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lib. 4. cap. 3.
Soliman. lib. 6. c. 4.*

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Others attribute this actuall heat of Baths vnto the Sunne, whose beames peircing through the pores of the earth, doe heat our waters. The Sunne by his light and beames, no doubt, doth warme these inferiour parts, especially where they haue free passage, and reflection withall, and it is to be iudged, that the heat not being essentially in the Sunne, is an effect of the light by whose beames it is imparted to vs. So as where light is excluded, heat is also excluded. And if wee can exclude the heat of the Sunne by the interposition of a mud wall, or by making a Cellar six foot vnder the ground; how is it likely that these beames can peirce so deepe into the earth, as to heat the water there? as *Lucretius* saith.

*Qui queat hic subter tam crasso corpore terram Lib. 6.
Percoquere humorem, & calido sociare vapor?
Præsertim cum vix possit per septa domorum
Insinuare suum radijs ardentibus æstus.*

And if the Sunne be not able to heat a standing Poole in the midst of Summer, how should it heat a subterraneall water, which is alwayes in motion, especially in the winter time? Again, if this heat come from the Sunne, then in the Summer, when the Sun is hottest, the waters should be so also; and in winter cold, because of the absence of the Sunne; but we finde them alwayes alike. Neither can any Antiperistasis be equiuallent to the Sunnes presence to continue their heat. It should rather diminish it by the opposite quality of cold: for, adde cold to any heat, and the cold by working vpon the heat, doth bring it to a temper, and makes the heat lesse; otherwise how should a temperament arise from the mixture of the Elements, if there were not a reacti-

Vales. cont. c. 5.

Magrus l. 3. c. 3

on, and a resistence, which reduceth the mixture to his temperament. Wherefore this Antiperistasis is an idle inuention to maintaine this purpose.

Others attribute this actuall heat to quick Lyme, which we see doth readily heat any water cast vpon it, and also kindle any combustibile substance put into it; this is *Democritus* his opinion. To this I answer, that Lyme is an artificiall thing, not naturall, and is neuer found in the bowels of the earth. Besides, if it were found, one infusion of water extinguisheth the heat of it, and then it lyeth like a deade earth, and will yeeld no more heat. So as this cannot procure a perpetuall heat to Baths: neither can the Limestones without calcination, yeeld any heat to water, nor will breake and crackle vpon the affusion of water, as Lyme doth. Wherefore this opinion is altogether improbable.

Others attribute this actuall heat to a subterraneall fire kindled in the bowels of the earth vpon Sulphur and Bitumen. Now we are come to hell, which *Pithagoras* calls *Materiam Vatum*, falsique pericula mundi; *Metamorph. 15.* The dreame of Poets, and a forged feare. The largest description of it is in *Virgill*: from whence both Diuines and Philosophers deriue much matter: and *Baccius* doth belecue that there is such a thing in the center of the earth. But if we obserue *Virgill* well, we shall finde that he propounds it but as a dreame: for in the end of that booke he saith

Æneid. 6.

*Sunt gemina somni porta; quarum altera fertur
Cornea, qua veris facilis datur exitus umbris:
Altera candenti perfecta nitens Elephanto,
Sed falsa ad Cælum mittunt insomnia manes.*

Dreames

Dreames haue two gates, the one is said to be
Of Horne, through which all true conceits do flee:
The other framed all of Iuory rare,
But lets out none, but such as forged are.

Now saith he, when *Anchyses* had led *Aeneas* and
Sibilla through Hell, hee lets them forth at the Iuory
gate (*Portaque emittit Eburna:*) As if he should say;
all that I haue related of hell, is but a fiction; and thus
Ludouicus Vines interprets it, in his comment vpon this
place.

I hope none will thinke that I deny a Hell, but I ap-
proue not of the assignement of it to the center of the
earth, or that that fire should serue, as *Baccius* would haue
it, to further all generations in the earth: and as others,
to be the cause of Fountaines, Windes, Earth-quakes,
Vulcanoes Stormes, Saltnesse of the Sea, &c. nor of the
actuall heate of our Bathes, although it be the most com-
mon receiued opinion.

First for the place, it is not likely that the center of
the earth, whither all heauie things doe tend, should be
hollow, but rather more compact then any other part
of the earth, as likewise *Valesius* thinkes: but if there bee
any concauities, they are betweene the Center and the
Superficies; and these concauities being receptacles of
water from the Sea, cannot also receiue fire. These two
will not agree together in one place, but the one will
expell the other: for whereas some hold that Bitumen
will burne in water, and is nourished by it, it is absolute-
ly false, as experience shewes; and I haue touched it a-
mong the Bitumina.

Agricola.
Baccius lib. 1.
cap. 19.

Moreouer, if the heate which warmes our Bathes did
proceede from hence, there must be huge vessels aboue
the fire to containe water, whereby the fire might heate
it,

it, and not be quenched by it. Also the vapours arising from hence, must bee hotter then water can endure, or be capable of: for as they ascend towards the Superficies of the earth, they must needes bee cooled as they passe by rockes, or else they could not be congealed into water againe: and after this congelation, the water hath lost most of his heate, as we finde in our ordinary distillations of Rose water, &c. where we see our water to descend into the receiuer, almost cold; so that they cannot deriue our hot Bathes from hence.

Secondly, for the fire it selfe, although water and ayre may be receiued into the bowels of the earth, yet there is great difficulty for fire. For the other two neede no nourishment to support them, as fire doth. If there bee not competencie of ayre to nourish the fire, howsoever there be fewell enough, it is suddenly quenched, and such huge fire as this must be, will require more ayre, then can there be yeilded: a great part thereof passing away through the secret creekes of rocks, and little or none entring through the Sea. And therefore daily experience shewes, that our minerall men are faine to sinke new Shafts (as they call them) to admit ayre to their works, otherwise their lights would goe out. Although one would thinke that where many men may haue roome enough to worke, there would be space enough for ayre to maintaine a few lights. The like we see in Cupping-glasses, where the light goes out as soone as they are applied. Also there are no fires perpetuall, as hot Bathes are, but are either extinct, or keepe not the same tenor. Wherefore fire cannot bee the cause of this constant heate of Bathes. Also where fire is, there will be smoake, for as it breedes exhalations, so it sends them forth. But in most of our hot Bathes wee finde none of these dry exhalations. Moreouer fire is more hardly pend in then
ayre;

ayre, yet we see that ayre doth breake forth: wherefore fire should also make his way, hauing fewell enough to maintaine it. So they say it doth in our Vulcanoës at Hecla in Iseland, Ætna in Sicily: Vesuuio in Campania: in Enaria, Æolia, Lipara, &c. But it is yet vnproued that these eruptions of fire, doe proceede from any deepe cause, but onely are kindled vpon or neere the superficies of the earth, where there is ayre enough to feede it, and meanes enough to kindle it by lightnings, or other casuall meanes. Whereas in the bowels of the earth, there is neither ayre to nourish it, nor any meanes to kindle it: seeing neither the beames of the Sunne, nor Winde, or other exhalations, nor Lyme, nor Lightnings, can doe it. For the same reasons that exclude the beames of the Sunne and exhalations, will likewise exclude Lightnings.

Thirdly, for the fewell, there are onely two substances in the bowels of the earth, which are apt fewels for fire, Bitumen and Sulpher.

Sulpher is in such request with all men, as they think there can be no hot Bath without it: nay many hold, that if water doe but passe through a myne of Brimstone, although it be not kindled, but actually cold, yet it will contract from thence, not onely a potentiall, but an actuall heate. But we doe manifestly finde, that neither all hot waters are sulphurous, nor all sulphurous waters hot (as is said before in Sulpher.)

Donatus de aquis lucensibus lib. 1. cap. 8.

The Bathes of Caldanella and Auinian, *in agro Senensi, De Grotta in viterbio, De aquis in pisano, Dni Iohannis in agro Lucensi, Balneum Gebersuilleri in Halsaia, &c.* are all hot, and yet giue no signe of sulphur, either by smell or taste, or qualitie, or effect. Contrariwise that all sulphurous waters are not hot, may appeare by the Bathes of Zurich in Heluetia, of Buda in Pannonia, at

Cure in Rhetia, Celenfes in Germany. In Campania, betweene Naples and Buteolum, are many cold sulphurous Springs. At *Brandula in agro Carpenfi, &c.* All which Bathes shew much Sulphur to be in them, and yet are cold. And no meruaile, for if we infuse any simple, be it neuer so hot potentially, yet it will not make the liquor actually hot. Wherefore this Sulphur must burne before it can giue any actuall heate to our Bathes; and then it must needes be subiect to the former difficulties, and also must bee continually repaired by new generations of matter, which actuall fire cannot further, but rather hinder. The fire generates nothing, but consumes all things.

Lib. 1. c. ult.

The like we may iudge of Bitumen, that vnlesse it be kindled, it can yeeld no heate to our Bathes: as *Solinander* reports of a Bituminous Myne in Westfalia in *agro Tremonensi*, where going downe into the groue, hee found much water, hauing the smell, taste, and colour of Bitumen, and yet cold. *Agricola* imputes the chiefe cause of the heating of Bathes, vnto the fewell of Bitumen, *Baccius* on the other side to Sulphur. But in mine opinion, they need not contend about it. For as I haue shewed before in the examples of minerall waters, there are many hot Springs, from other minerals, where neither Sulphur nor Bitumen haue beene obserued to be. *Iohn de Dondis*, and *Iulius Alexandrinus*, were much vn-satisfied in these opinions, and did rather acknowledge their ignorance, then that they would subscribe vnto them. I neede not dispute whether this fire be in *Alaeis*, or in *Canalibus*, or in *Vicinis partibus, &c.* because I thinke it is in neither of them.

CAP.

CAP. 13.

The Authors opinion concerning the cause of actuall heat, and medicinable virtue in minerall waters.

Wherefore finding all the former opinions to bee doubtfull and weakely grounded, concerning the causes of the actuall heat of Baths: let me presume to propound another, which I perswade my selfe to bee more true and certaine. But because it hath not beene mentioned by any Author that I know, I haue no mans steps to follow in it.

*Avia Doctorum peragro loca, nullius ante
Trita solo.*

I trauell where no path is to be seene
Of any learned foot that here hath beene.

Which makes me fearfull in the deliury of it. But if I doe erre in it, I hope I shall not be blamed; seeing I doe it in disquisition of the truth.

I haue in the former Chapter set downe mine opinion concerning the generation of minerals; that they haue their seminaries in the earth replenished with spirits, and faculties attending them: which meeting with conuenient matter and adiuuant causes, doe proceede to the generation of seuerall species, according to the nature of the efficient and aptnesse of the matter. In this worke of generation, as there is *generatio animi*, so there must be *corruptio alterius*. And this cannot bee done without a superiour power, which by moysture, dilating it selfe, worketh vpon the matter, like a ferment to bring it to his owne purpose. This motion betweene

the agent spirit, and the patient matter, produceth an actuall heat (*ex motu fit calor*) which serues as an instrument to further this worke. For as cold duls, and benumbes all faculties, so heat doth quicken them. This I shewed in the example of Malt. It is likewise true in euery particular grayne of Corne, sown in the ground, although by reason they lye single, their actuall heat is not discernable by touch; yet wee finde that externall heat and moysture doe further their spiring, as adiuuant causes: where the chiefe agent is the generatiue spirit in the seed. So I take it to bee in minerals, with those distinctions before mentioned. And in this all generations agree, that an actuall heat, together with moysture, is requisite: otherwise there can neither be the corruption of the one, nor the generation of the other. This actuall heat is lesse sensible in small seeds and tender bodyes, then it is in the great and plentifull generations, and in hard and compact matter: for hard bodies are not so easily reduced to a new forme, as tender bodies are; but require both more spirit, and longer time to be wrought vpon. And therefore whereas vegetable generations are brought to perfection in a few moneths, these minerall generations doe require many yeares, as hath beene obserued by minerall men. Moreover, these generations are not terminated with one production, but as the seed gathereth strength by enlarging it selfe; so it continually proceeds to subdue more matter vnder his gouernment: so as, where once any generation is begun, it continues many ages, and seldom giues ouer. As we see in the Iron mynes of Ilma, the Tinne mynes in Cornwall, the Lead mynes at Mendip, and the Peake, &c. which doe not only stretch further in extent of ground, then haue beene obserued heretofore; but also are renewed in the same groues which

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which haue beene formerly wrought, as our Tanners in Cornewall doe acknowledge; and the examples of *Ilma* cap. 11. and *Saga* before mentioned doe confirme. This is a sufficient meanes for the perpetuities of our hot Springs: that if the actuall heate proceede from hence, there neede be no doubt of the continuance of them, nor of their equall Tenor or degree of heate.

Now for the nature of this heate, it is not a destructive heate, as that of fire is, but a generative heate ioyned with moysture. It needes no ayre for euentilation, as the other doth. It is in degree hot enough for the hottest Bathes that are, if it bee not too remote from the place where the water issueth forth. It is a meanes to impart the qualities of minerals to our waters, as well as heate, by reason the minerals are then *in solutis principijs*, in their liquid formes, and not consolidated into hard bodies. For when they are consolidated, there are few of them that will yeeld any quality to water, vnlesse they be the concrete iuyces, or any actuall heate, because that is procured by the contiguity of bodies, when one part lyeth vpon another, and not when they are growne *in corpus continuum*. As we see in Malt, where by turning and changing the contiguities, the heate is increased, but by suffering it to vnite, is quenched: But before consolidation, any of them may yeeld either Spirit, or Iuyce, or Tincture to the waters, which by reason of their tenuitie (as is said before) are apt to imbybe them. Now if actuall fire kindled in the earth, should meete with these minerals, whilst they are in generation, it would dissipate the Spirits, and destroy the Minerals. If it meete with them after consolidation, it will neuer be able to attenuate them so, as to make them yeeld their qualities to water. For wee neuer finde any Metals or Minerals melted in the earth, which must be, if the heate of actuall fire were such as is imagined: neither doe wee euer

*Thurkeiser Al-
chimie magna
lib. 4. cap. 8.*

finde any floores of metall sublimed in the earth. This naturall heat is daily found by our Minerall men in the Mines, so as oftentimes they are not able to touch them, as *Agricola* testifieth; although by opening their groues and admission of ayre, it should be wel qualified. Whereas on the other side, it was neuer obserued, that any actuall kindled fire was euer scene by workmen in the earth, which were likely to be, if these fires were so frequent.

Wherefore seeing we see that Minerall waters do participate with all sorts of Minerals, as weil metals, as other, as hath beene shewed in the particular examples of all of them: seeing also that few of them, vnlesse Minerall iuyces, are able to impart their quality to water, as they are consolidated, but only as they are *in solutis principijs*, and whilst they are in generation, as is agreed vpon by all Authors: seeing also this naturall heat of fermentation must necessarily be present for the perfecting of their generations, and is sufficient, in regard of the degree of heat to make our Baths as hot as they are: seeing also that the other aduentitious fire, would rather destroy these Minerals, then further them: seeing also we cannot imagine it either likely, or possible, without manifold difficulties, and absurdities: I doe conclude that both the actuall heat of Baths, and the Minerall qualities which they haue, are deriued vnto them by meanes of this fermenting heat.

*Martin, de pri-
ma generatione.*

Examples might be brought from all kinde of generations, and from some artificiall works, of this fermenting heat proceeding from the seeds of naturall things. These seeds containing the species, and kinds of naturall bodies, are not from the Elements, but are placed in the Elements, where they propagate their species, and individuals, according to their nature; and

and haue their due times and seasons of appearing vpon the Stage of the World. Animals haue their set times when their spermatick spirits are in turgescence, some once, some twice a yeare, and some oftner : especially in the spring : *vere magis, quia vere calor redit ossibus* ; as *Virgill* speakes of Mares : only man in regard of his excellency aboue other creatures, is not so confinde.

Vegetables haue likewise their seasons of setting and planting, as they may haue the earth and the season most conuenient : yet at any time, if their seeds get moysture and heat to dilate them, they will ferment and attempt the production of moe indiuiduals : but oftentimes the Artist doth abuse this intention of nature, and conuert it to his ends : and oftentimes nature being set in action to proccede *à potentia in actum*, doth want conuenient meanes to maintaine her worke : as when we see a Ryck of Hay or Corne which hath receiued moysture, burnt to ashes. So in the making of Malt, or Woad, or Bread, or Beere, or Wine, &c. wee make vse of this generatiue spirit for our ends : that we may stirre vp, and quicken it. Otherwise our Bread would not be so sauory, our Beere would be but Wort, our Wine would be but Must, or Plumpottage, and want those spirits which we desire, and which lie dead and benumbed in the seeds, vntill they come to fermentation. And in all these there is an actuall heat, although it appeare not in liquid things, so well as in dry : because it is there quenched, by the abundance of moysture : yet we may obserue actiue Spirits in it, by the bubling and hissing, and working of it. So in minerals, which as they haue this generatiue Spirit, for the propagation of their Species, as hath beene shewed before, so they haue this meanes of fermentation, to bring them from

from a potentiall qualitie, to an actuall existence: And as their matter is more plentifull, and in consistence more hard and compact; so these Spirits must bee more vigorous and powerfull to subdue it: and consequently the heate of their fermentation must bee in a higher degree, then it is in other generations. And this is in brieft (though rudely deliuered) mine opinion concerning the actuall heate of our Bathes, and of the minerall qualities which we finde in them: which I referre to the censures of those that be learned.

There are two other motions which resemble this fermentation. The one is *Motus Dilatationis*, the other *Antipatheticus*. *Motus Dilatationis* is euident in Lyme, in Allum, in Coperos, and other concrete iuyces, where by the effusion of water, the Salt in the Lyme, or the concrete iuyces being suddenly dissolued, there is by this motion, an actuall heate procured for a time, able to kindle any combustible matter put to it.

The like we obserue in those Stone Coales, called metall Coales, which are mixed with a Marchesit containing some minerall iuyce, which receiuing moysture, doth dilate it selfe, and growes so hot, as oftentimes great heapes of those Coales are kindled thereby, and burnt before their time; as hath beene scene at Puddle Wharfe in London, and at Newcastle. But this is much different from our fermentation.

Another *Motus* resembling this fermentation, is that which is attributed to Antipathie, when disagreeing substances being put together, doe fight, and make a manifest actuall heate, as Antimony and Sublimat, oyle of Vitrioll, and oyle of Tartar, Allum Liquor and Vrine, Lees, Chalke, &c. But the reason of this disagreement is in their Salts, whereof one is astringent, the other relaxing; the one of easie dissolution in water, the other

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other of hard dissolution, &c. and not by reason of any antipathie: for it is not likely that nature would produce two contrarie substances mixed like atomes in one subject, but that in their very generations, the one would be an impediment to the other. Moreover if wee examine aright what this Sympathie and Antipathie is, we shall finde it to be nothing but a refuge of ignorance, when not being able to conceiue the true reasons of such actions, and passions in naturall things, wee flye sometimes to indefinite generalities, and sometimes to this inexplicable Sympathie and Antipathie: attributing voluntaries, and sensitiue actions and passions to insensible substances. This *motus* also is much different from fermentation, as may easily appeare by the former description. And thus much for this point of fermentation, which I hope will giue better satisfaction then any of the former opinions.

CAP. 14.

By what meanes it may be discovered what minerals any water containeth.

THe nature of minerals and their generations being handled, and from thence the reasons drawne, both of the actuall heate of Bathes, and of their qualities: Now it is fit we should seeke out some meanes, how to discover what minerals are in any Bath, that thereby we may the better know their qualities, and what vse to make of them for our benefit. Many haue attempted this discovery, but by such weake meanes, and vpon such poore grounds, as it is no mernaile if they haue failed of their purpose: for they haue contented themselves with a bare distillation or euaporation of the water, and

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observing the sediment, haue thereby iudged of the minerals, vnlesse perhaps they finde some manifest taste, or smell, or colour in the water, or some vinctuous matter swimming aboue it. Some desire no other argument of Sulphur and Bitumen, but the actuall heate: as though no other minerals could yeeld an actuall heate, but those two. But this point requires better consideration; and I haue beene so large in describing the natures and generations of minerals, because without it, wee cannot discern what minerals we haue in our waters, nor iudge of the qualities and vse of them.

Our Minerals therefore, are either confused or mixed with the water. If they bee confused they are easily discerned: for they make the water thick and pudly, and will either swim aboue, as Bitumen will doe, or sinck to the bottome, as earth, Sulphur, and some terrestriall iuyces; for no confused water will remaine long vnseparated. If they are perfectly mixed with the water, then their mixture is either corporall, where the very body of the Minerall is imbibed in the water, or spirituall, where either some exhalation, or spirit, or tincture is imparted to the water.

Corporally there are no mineralls mixed with water, but iuyces, either liquid, as *succus lapidescens metallicus*, &c. before they are perfectly congeled into their naturall consistence, or concrete, as Salt, Niter, Vitriol, and Allum. And these concrete iuyces doe not only dissolue themselues in water, but oftentimes bring with them some tincture or spirit from other Minerals. For as water is apt to receiue iuyces, and tinctures, and spirits from animals, and vegetables; so are concrete iuyces, being dissolued, apt to extract tinctures and Spirits from minerals, and to communicate them with water. And there are no Mynes, but haue some of these

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these concrete iuyces in them, to dissolue the materials of them, for their better vnion and mixture: and there are few minerals or metals, but haue some of them incorporated with them: as we see in Iron, and Copper, and Tinne, and Leade, &c. And this is the reason that water being long kept in Vessels, of any of these metals, it will receiue a taste and smell from them, especially if it be attenuated, either by heate, or by addition of some soure iuyce; and yet more, if the metals be fyled into powder, as we see in making Chalibeat wine, or Sugar of Leade, or Puttie from Tinne, or Verdegrease from Copper. There may be also a mixture of Spirituall substance from minerals, whilst they are in generation, and *in Solutis principijs*: the water passing through them, and the rather if it be actually hot, for then it is more apt to imbybe it, and will containe more in it, being attenuated by heate, then being cold; as we see in Vrines, which though they be full of humours, yet make no great shew of them so long as they are warme, but being cold, doe settle then to the bottome.

These spirituall substances are hardly discerned in our Baths, but by the effects; for they leaue no residence after euaporation; and are commonly as volutill in sublimation as the water it selfe: neither doe they encrease the weight of the water, nor much alter the taste or smell of them, vnlesse they be very plentifull. Wherefore we haue no certaine way to discouer them, but by the effects. We may coniecture somewhat of them by the Mynes which are found neare vnto the Baths, and by the mud which is brought with the water. But that may deceiue, as comming from the passages through which the water is conueyed, or, perhaps, from the sweat and strigments of mens bodyes which bathe in them. The corporall substances are found, either by

Sublimation or by precipitation. By Sublimation, when being brought to the state of congelation, and stickes of Wood put into it, within a few dayes, the concrete iuyces will shoote vpon the wood; in Needles, if it be Niter; in Squares, if it be Salt; and in Clods and Lumps, if it be Allum or Coperose; and the other minerall substance which the waters haue receiued, will either incorporate a tincture with them, or if it be more terrestriall, will settle and separate from it, and by drying it at a gentle fire, will shew from what house it comes, either by colour, taste, smell, or vertue: There is an other way by precipitation, whereby those minerall substances are stricken downe from their concrete iuyces which held them, by addition of some opposite substance. And this is of two sorts: either Salts, as Tartar, Soape, Ashes, Kelps, Vrine, &c. Or sowre iuyces, as Vinegar, Lymons, Oyle of Vitrioll, Sulphur, &c. In which I haue obserued that the Salts are proper to blew colours, and the other to red: for example, take a piece of Scarlet cloath, and wet it in Oyle of Tartar (the strongest of that kinde) and it presently becomes blew: dip it againe in Oyle of Vitriol, and it becomes red againe.

These are the chiefe grounds of discovering minerall waters, according to which any man may make tryall of what waters he please. I haue beene desirous heretofore to haue attempted some discouerie of our Bathes, according to these principals: but being thought (by some) either not conuenient, or not vsfull, I was willing to saue my labour, which perhaps might haue seemed not to be worth thanks: and in these respects am willing now also to make but a bare mention of them.

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CAP. 9.

Of the use of Minerall waters, inwardly, outwardly. In this Chapter is shewed the inward use of them, first in generall; then particularly of the hot waters of Bathe.

THe nature and generations of Minerals being handled, and how our Minerall waters receiue their impressions, and actuall heat from thence; and by what meanes they are to be tried, what Minerals are in each of them. Now we are to shew the uses of them; which must bee drawne from the qualities of the Minerals whereof they consist: which are seldome one or two, but commonly moe. These qualities are either the first, as hot, cold, moyst, & dry; or the second, as penetrating, astringent, opening, resoluing, attracting, clensing, mollifying, &c. For the first qualities, it is certaine and agreed vpon by all Authors; That all Minerall waters doe dry exceedingly, as proceeding from earth: but some of those doe coole withall, and some doe heat.

Cooling waters are good for hot distemperatures of the liuer, stomach, kidneyes, bladder, wombe, &c. Also for salt distillations, sharp humors, light obstructions of the Mesaraicks, &c.

Heating waters are good for cold affects of the stomach, bowels, wombe, seminary vessels, cold distillations, Palsyes, &c.

For the second qualities, clensing waters are good in all vlcers, especially of the guts.

Mollifying waters, for all hard and schirrous tumors.

Astringent waters, for all fluxes, &c. and so of the rest.

Now these waters are vsed either inwardly or outwardly.

Inwardly, either by mouth, or by iniection.

By mouth, either in potion, or in broaths, iuleps, &c.

6 de tuenda
nit. cap. 9.

Galen neuer vsed them inwardly, because hee iudged their qualities to be discouered by experience, rather then by reason. And seeing we finde many of them to be venomous, and deadly, as proceeding from Arsenick, Sandaracha, Cadmia, &c. we had need bee very wary in the inward vse of them.

Neptunes Well in Tarracina was found to be so deadly, as it was therefore stopped vp. By Montpellier at Perant is a Well which kills all the fowles that drinke of it; the lake Auernus kills the fowles that fly ouer it; so doth the vapour arising from Charons den betweene Naples and Puteolum. So there are diuers waters in Sauoy and Rhetia, which breede swellings in the throat. Others proceeding from Gypsum doe strangle, &c. But where we finde waters to proceede from wholesome Minerals, and such as are conuenient, and proper for our intents, there we may be bold to vse them as well inwardly as outwardly: yet so as we doe not imagine them to bee such absolute remedies, as that they are of themselues able to cure diseases without either rules for the vse of them, or without other helps adioyned to them. For as it is not enough for a man to get a good Damasco or Bilbo blade to defend himselfe withall, vnlesse he learne the right vse of it, from a Fencer; so it is not enough to get a medicine and remedy for any disease, vnlesse it be rightly vsed, and this right vse must come from the Physitian, who knowes how to apply it, and how to prepare the body for it, what to adde and ioync with it, how to gouerne and order the vse of it, how to preuent such inconueniences as may happen by it, &c.

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Wherefore, where we speake of any Minerall water, or of any other medicine that is proper for such & such a grieve, we must be so vnderstood, that the medicine is wise enogh to cure the disease of it selfe, no more then a sword is able of it selfe to defend a man, or to offend his enemy, but according to the right and skilfull vse of it. And as it is not possible for a Fencer to set down absolute rules in writing for his Art, whereby a man may be able in reading of them to defend himselfe ; no more is the Physitian possibly able to direct the particular vses of his remedy, whereby a patient may cure himselfe without demonstration and the paticular direction of the Physitian. It is true, that we haue generall rules to guide vs in the cure of diseases, which are very true and certaine ; yet when we come to apply them to particular persons, and seuerall constitutions, these general rules are not sufficient to make a cure, but is iustly varied according to circumstances. Hereupon we daily finde, that those patients which thinke to cure themselves, out of a little reading of some rules or remedies, are oftentimes dangerously deceiued. And this is enough to intimate generally concerning the vses of our Minerall waters.

Inwardly we finde great and profitable vse of such waters as proceed from Niter, Allum, Vitriol, Sulphur, Bitumen, Iron, Copper, &c. Examples whereof I haue set downe before in the seuerall Minerals, referring the particular vses of each to such Authors as haue purposely described them.

My intent is chiefly to apply my selfe to those Baths of Bath in Summersetshire ; which consisting, as I iudge, principally of Bitumen, with Niter, and some Sulphur, I hold to be of great vse both inwardly and outwardly. And I am sorry that I dare not commend
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the inward vse of them as they deserue, in regard I can hardly be perswaded that we haue the water pure, as the springs yeeld them, but doe feare, lest where wee take them, they may bee mixt with the water of the Bath. If this doubt were cleared, I should not doubt to commend them inwardly, to heat, dry, mollifie, discusse, glutinate, dissolue, open obstructions, cleanse the kidneyes, and bladder, ease cholicks, comfort the matrix, mitigate fits of the mother, helpe barrennesse proceeding from cold humors, &c. as *Tabernemontanus* affirmer of other Bitumious Baths. Also in regard of the Niter, they cut and dissolue grosse humors, and cleanse by vrine. In regard of the Sulphur, they dry and resolue, and mollifie, and attract, and are especially good for vterine effects proceeding from cold and windy humors. Our Bath Guides do usually commend the drinking of this water with salt to purge the body, perswading the people, that the Bath water hath a purging quality in it, when as the same proportion of spring water, with the like quantity of salt will doe the like. Our Baths haue true virtues enough to commend them, so as we need not seeke to get credit or grace vnto them by false suggestions. The Bitumen and Niter which is in them, although it serues well for an alteratiue remedy, yet it is not sufficient for an euacuatiue: and therefore we must attribute this purgatiue quality, either to the great quantity of water which they drink (and so it works) *ratione ponderis*) or vnto the stimulation of salt which is dissolued in it, or vnto both together. I should like much better to dissolue in it some appropriate sirrup or other, purgatiue, for this purpose, as Manna, Tartar, Elaterium, sirrups of Roses, of Cicory, with Rhewbarb, Augustinus: or to moue vrine, *Syr. de 5. rad, Bizantinus de Limonibus, Sambucinus de Althea,*
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&c. And this course is vsuall in Italy, according as the Physitian sees most conuenient, but with this caution, that when they take it in potion, they must not vse the Bath, because of contrary motions.

Inwardly also Bath waters are vsed, for Brothes, Beere, Iuleps, &c. although some doe mislike it, because they will not mixe medicaments with aliments : wresting a text in *Hippocr.* to that purpose. But if wee may mixe Diureticks, Deoppilatiues, Purgatiues, &c. with aliments, as vsually we doe. I see no reason but we may as well vse minerall waters, where we desire to make our aliments more alteratiue by a medicinall qualitie: alwaies prouided that there be no malignitie in them, nor any ill qualitie which may offend any principall part. And thus much for the vse of them by mouth.

By iniection they are vsed also into the VVombe, to warme and dry, and cleanse those parts; into the passages of vrine, to drie and heale excoriations there: into the fundament for the like causes, as also for resolutions of the Sphincter, and bearing downe of the fundament, &c. And thus they are vsed either alone, or mixed with other medicines, according as the Physitian thinks most fit, and we daily finde very good successe thereby in vterin effects, depending vpon cold causes. Thus much for the inward vse of our Bath waters.

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CAP. 16.

Of the outward vse of the hot waters of Bathe; first, the generall vse of them to the whole body, in bathing: secondly, the particular vse of them, by pumping, bucketing, or applying the mud.

Outwardly our Bath waters are principally vsed, because they are most properly for such effects, as are in the habit of the body, and out of the veines: As Palsies, Contractions, Rheumes, cold tumours, affects of the skin, aches, &c. And in these cases we vse not onely the water, but also the mudde, and in some places the vapour.

The water is vsed both for his actuall and potentiall heate, as also for the second qualities of mollifying, dissolving, cleansing, resolving, &c. which the minerals giue vnto it. The vse hereof is either generall to the whole body, as in bathing, or particular, to some one part, as in bucketting or pumping, which anciently was called *Stillicidium*. The Italians call it *Duccia*. The generall vse in Bathing, is most ancient: for our Bathes were first discovered thereby to be wholesome and so-ueraigne in many diseases.

Neckams verses concerning the vse of these Bathes, are foure hundred yeares old:

*Bathonia Thermas vix praefero Virgilianas
Confecto profunt Balnea nostra seni:
Presunt attritis, collis inuadisque
Et quorum morbis frigida causa subest.*

Which I will English out of Master Doctor *Hackmels* learned worke, of the perpetuities of the world.

Our

Our Baynes at Bathe with *Virgils* to compare;
 For their effects, I dare almost be bold,
 For feeble folke, and crazie good they are,
 For bruis'd, consum'd, farre spent, and very old,
 For those likewise whose sicknesse comes of cold.

We haue antient traditions (*fama est obscurior annis*)
 That King *Bladud* who is said to haue lined in the time
 of *Elias*, did first discouer these Bathes, and made tryall
 of them vpon his owne sonne, and thereupon built this
 Citie, and distinguished the Bathes, &c. But we haue no
 certaine record hereof. It is enough that wee can shew
 the vse of them for 4000. yeares, and that at this day
 they are as powerfull as euer they were: *Camden* giues
 them a more ancient date from *Ptolomy* and *Antonin*,
 and the Saxons: and saith they were called *Aqua Solis*,
 and by the Saxons *Akmanchester*, that is, the towne of
 sicke people, and dedicated to *Minerua*, as *Solinus* saith:
 The opinion that the Bathes were made by Art, is too
 simple for any wise man to beleue, or for me to confute:
 And *Necham* in his verses which follow after those I
 haue mentioned, doth hold it a figment: you may see
 them in *Camden*. We haue them for their vse in bathing,
 distinguished into foure seuerall Bathes, whereof three
 haue beene anciently: namely the Kings Bath, the hot
 Bath, and the Crosse Bath. The Queenes Bath was taken
 from the Springs of the Kings Bath, that being farther
 off, from the hot Springs, it might serue for such as
 could not endure the heate of the other. We haue like-
 wise an appendix to the hot Bath, called the Leapers
 Bath, for vncleane persons. We finde little difference in
 the nature of these Bathes, but in the degree of heate,
 proceeding no doubt, from one and the same Myne.
 Yet as the Myne may be hotter in one part then in an
 M 2 other,

other, or the passages more direct from it, so the heate of them may vary. Some little difference also we finde among them, that one is more cleansing then another, by reason (as I take it) of more Niter. For in the crosse Bath wee finde that our fingers ends will shrinke and shriuell, as if we had washed in Soape water, more then in the other Bathes. The Kings Bath, as it is the hottest of all the Bathes, so it is the fittest for very cold diseases, and cold and plegmaticke constitutions: And we haue daily experience of the good effects it worketh vpon Palsies, Aches, Sciaticaes, cold tumours, &c. both by euacuation, by Sweate, and by warming the parts affected, attenuating, discussing, and resolving the humors: Also in Epilepsies and Vterin affects in the Scorbut, and in that kinde of drop sic which wee call Anasarca. The hot Bath is little inferiour vnto it, as next in degree of heate, and vsfull in the same cases. The Queenes Bath, and Crosse Bath are more temperate in their heate, and therefore fittest for tender bodies, which are apt to bee inflamed by the other, and where there is more neede of mollifying and gentle warming, then of violent heate and much euacuation by sweate. And in these Bathes they may indure longer without dissipation of Spirits, then in the other: the Queenes Bath is the hotter of the two, but temperate enough for most bodies. The Crosse Bath is the coldest of all, as hauing but few Springs to feede it: yet we obserue it to supple, and mollifie more then the rest, both because they are able to stay longer in it, and because (as I said before) it seemes to participate more with Niter, then the rest, which doth cleanse better, and giues more penetration to the other Minerals. Wherefore in contractions, Epilepsies, Vterin affects, Conuulsions, Cramps, &c. This Bath is very vsfull, as also in cutaneall diseases, as Morpewes, Itch,

Itch, &c. Thus much for the nature and difference of our Bathes, and the generall vse of them in bathing.

They are vsed also to particular parts by pumping or bucketting, or applying the mud.

Pumping or bucketting are not vsed in that fashion, as we vse them, in any other Baths that I can learne, but only the Duccia or Stillicidium : But I hold our fashion as good as that. The water comes more plentifully vpon the part, and may be directed as the patient hath occasion. Our bucketting hath bene longest in vse : but finding that it did not heat some sufficiently, being taken from the surface of the Bath. We haue of late erected Pumpes, which draw the water from the springs or neare vnto them, so as wee haue it much hotter from thence, then wee can haue it by bucketting. A worthy Merchant and Citizen of London, M. *Humphrey Browne*, was perswaded by me to bestow two of these Pumps vpon the Kings and Queenes Bath, whereby he hath done much good to many, and deserves a thankfull remembrance. The like also I procured to be done at the other Baths, although that of the Crosse Bath is not so vsfull, by reason it wants heat, vnlesse for yong children. Also we haue a Pumpe out of the hot Bath, which we call the dry Pumpe, where one may sit in a chayre in his clothes, and haue his head, or foot, or knee pumped without heating the rest of the body in the Bath ; and deuised chiefly for such as haue hot kidneys, or some other infirmities which the Bath might hurt. This we finde very vsfull in rheumes and cold Braines, and in aches or tumors in the feet. For these Pumps we are beholding vnto the late Lord Archbishop of Yorke, and to M. *Hugh May*, who vpon my perswasions were contented to bee at the charge of them. It were to be wished that some well disposed

to the publique good, would erect the like at the Kings Bath, where, perhaps, it might be more vsfull for many, in regard of the greater heat which those springs haue.

The lute of Baths, is in much vse in some places, where it may be had pure, both to mollifie, and to resolue, and to strengthen weake parts. But we make little vse of it in our Baths, because we cannot haue it pure, but mixed with strigments. In diuers other places either the springs arise agood distance from the bathing places, or else there be other eruptions from whence it may bee taken. But our springs arising in the Baths themselves, it cannot well be saued pure. Besides, we haue not those meanes of the heat of the Sunne, to keepe it warme to the parts where it is applyed: so as growing cold, it rather does hurt, then good. Wherefore it were better for vs, to vse artificall lutes, as the Ancients did, of clay, Sulphur, Bitumen, Niter, Salt, &c. or vnguents of the same nature, as that which they call Ceroma. But the best way is to referre the election of these remedies, to the present Physitian, who will fit them according to the nature of the grieve.

CAP. 17.

In what particular infirmities of body, bathing in the hot waters of Bath is profitable.

TO come more particularly to the vse of bathing, we must vnderstand, that there are many Minerall waters fit for bathing, which are not fit to drinke: as those which participate with Lead, Quicksiluer, Gypsum, Cadmia, Arsenick, &c. Also those that containe liquid Bitumen, are thought to relaxe too much: but those

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those that proccede from dry Bitumen, are permitted, and prescribed in potion, by *Paulus Aegineta*, and *Trallian*: Sulphur also is questioned, whether it bee fit to be taken inwardly by potion, because it relaxeth the stomach, and therefore *Actius* forbids it: yet *Trallian* 1. Tretrab. form. 3. cap. 167. Trallian l. 10. c. 1 allowes it, and so doe others, if the Sulphur be not predominant. But for outward bathing there is no question to be made of these Minerals, nor of any other which are not in themselves venomous. And whereas *Oribasius*, *Aegineta*, *Actuarius*, &c. are suspicious of Sulphur and Bitumen for the head; they must bee vnderstood of hot distempers there, and not of cold rheumatick braines; where by daily experience wee finde the profitable vse of them, both by euacuation in bucketting, and by warming and comforting the cold part. And *Oribasius* doth ingenuously confesse, that the nature of these Baths was not then perfectly discovered: Cap. 53 Hippoc. de acie, aquis, & locis. and therefore they were all held to bee, not only dry, but very hot: although we finde them not all so: for, Iron waters doe coole, and so doe those of Campher, and Alluminous, and Nitrous waters also. But for our Bituminous and Sulphurous waters, which *Galen* forbids in hot braines, there is no reason to suspect them de sanit. tuenda lib. 6. cap. 9. in cold effects of the braine and nerues, in which cases we make especiall choyce all things, which either in taste or smell doe resemble Bitumen: as Rue, Castorurn, *Valeriana*, *herba paralyseos*, *trifolium*, *asphaltis*, &c; which both by his warming quality, and by his suppling and mollifying substance, is most proper and conuenient for those parts. The like I may say of Sulphur, in which nothing can bee excepted against, but his sharp spirit, which is made by burning: and wee haue none of that in our waters, nor, I hope, any fire to make it withall. The other parts of Sulphur are hot and

and dry, and very vnctuous. As for Niter, it clenſeth, purgeth both by ſtoole and vrine, and helpeth the incorporation of the other Minerals with the water, and qualifies the heat of them, and giues them better penetration into our bodies. In regard of theſe Minerals, together with the actuall heat, we finde that the bathing in our Baths doth warme the whole habit of the body, attenuate humors, open the pores, procure ſweat, moue vrine, cleanſe the matrix, prouoke womens euacuations, dry vp vnnaturall humors, ſtrengthen parts weakned, comfort the nerues, and all neruous parts, cleanſe the ſkin, and ſuck out all ſalt humors from thence, open obſtructions if they be not too much impacted, eaſe paines of the ioynts, and nerues, and muscles, mollifie and diſcuſſe hard tumors, &c. Whereby this bathing is profitable for all palsies, apoplexies, caros, epylepsies, ſtupiditie, deſluctions, goutts, ſciaticaes, contractions, cramps, aches, tumors, itches, ſcabs, leproſies, collicks, windines, whites in women, ſtopping of their courſes, barrenneſſe, abortions, ſcorbutts, anaſurcas, and generally all cold and phlegmatick diſeaſes, which are needleſſe to reckon vp. In all which cures our Bathes haue a great hand, being ſkillfully directed by the Phyſitian, with preparation of the body before, and addition of ſuch other helps as are needfull. And whereas without the helpe of ſuch Baths theſe diſeaſes could not be cured without tormenting the body, either by fire, or launcing, or cauſticks, or long dyets, or bitter and vngratefull medicines, &c. In this courſe of bathing all is pleaſant and comfortable, and more effectuell then the other courſes, and therefore it is commonly the laſt refuge in theſe caſes, when all other meanes faile. I will not vndertake to reckon vp all the benefits which our Baths doe promiſe; but if wee had a register kept of the manifold

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manifold cares which haue beene done by the vse of our Bathes principally, it would appeare of what great vse they are. But as there is a defect in not keeping a Catalogue of rare Cures, so many persons of the better sort would be offended if a Physitian should make any mention of their cures or griefes: wherefore I must speake but generally:

CAP. 18.

The manner of bathing, chiefly referred to the inspection and ordering of a Physician. Yet some particulars touched, concerning the gouvernement of the Patient in and after bathing: the time of day, of staying in the Bathe, of continuing the vse of it. The time of the yeare. Of couering the Baths.

NOW for the manner of Bathing, I will not set downe what the Physitian is to doe, but leaue that to his iudgement and discretion: but what is fit for the Patient to know: for there are many cautions and obseruations in the vse of bathing, drawne from the particular constitutions of bodies; from the complication of diseases, and from many other circumstances which cannot be comprehended in generall rules, nor applied to all bodies alike: But many times vpon the successe, and the appearing of accidents, the Physitian must *ex re nata capere consilium*, and perhaps alter his intended course, and perhaps change the Bath either to a hotter or cooler, &c. In which respect, those Patients are ill aduised which will aduventure without their Physitian vpon any particular Bath, or to direct themselves in the vse of it. And this is a great cause that many goe away from hence without benefit, and then they are apt to

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complaine of our Bathes, and blasphemie this great blessing of God bestowed vpon vs.

It is fit for the Patient when he goeth into the Bath, to defend those parts which are apt to be offended by the Bath: as to haue his Head well couered from the ayre and winde, and from the vapours arising from the Bath: also his kidneyes (if they be subiect to the Stone) anoynted with some cooling vnguents; as *Rosatum committisse infrigidans Galeni Santolinum, &c.* Also to begin gently with the Bath, till his body be inured to it, and to be quiet from swimming, or much motion, which may offend the Head by sending vp vapours thither: at his comming forth, to haue his body well dryed, and to rest in his Bed an houre, and sweate, &c.

A morning houre is fittest for Bathing, after the sunne hath bin vp an houre or two; and if it be thought fit to vse it againe in the afternoone, it is best foure or five houres after a light dinner. For the time of staying in the Bath, it must bee according to the qualitie of the Bath, and the tolleration of the Patient. In a hot Bath, an houre or lesse may be sufficient: in a temperate Bath, two houres. For the time of continuing the Bath, there can be no certaine time set downe, but it must be according as the Patient findes amendment, sometimes twenty dayes, sometimes thirty, and in difficult cases much longer. And therefore they reckon without their Host, which assigne themselves, a certaine time, as perhaps their occasions of businesse will best afford. For the time of the yeare, our Italian and Spanish Authors preferre the Spring and Fall; and so they may well doe in their hot Countries; but with vs considering our clymat is colder, and our Bathes are for cold diseases; I hold the warmest moneths in the yeare to be best; as May, Iune, Iuly, and August; and I haue perswaded many hereunto

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to who haue found the benefit of it; for both in our Springs, and after September, our weather is commonly variable, and apt to offend weake persons; who finding it temperate at noone, doe not suspect the coolnesse of the mornings and euenings. Likewise in the Bath it selfe, although the Springs arise as hot as at other times, yet the winde and ayre beating vpon them, doth doe them much harme, and also make the surface of the water much cooler then the bottome: and therefore *Claudianus* wisheth all Bathes to be couered, and *Fallopianus* findes great fault with the Lords of Venice, that they doe not couer their Bath at Apono. Wee see also that most of the Bathes in Europe, are couered, whereby they retaine the same temperature at all times. And it were to be wished that our Queenes Bath, and Crosse Bath, being small Bathes, were couered, and their Slips made close and warme. By this meanes our Bathes would be vsfull all the yeare, when neither winde and cold ayre in winter, nor the Sunne in summer, should hinder our bathing. Moreouer for want of this benefit, many who haue indifferently wel recovered in the Fall, doe fall backe againe in the winter before the Cure bee perfectly finished: and as this would be a great benefit to many weake persons, so it would be no harme to this Citie, if it may be a meanes of procuring more respect hither in the Winter time, or more early in the Spring, or more late at the Fall. The Right Honourable, the Earle of *Marleborow*, hath of his owne accord and noble disposition to doe any Bathes good, vndertaken the couering of the Crosse Bath vpon his sole charge. If some other out of the like affection would doe the like for the Queenes Bath, they should doe much good to many, and gaine a thankfull remembrance to their names for cuer.

I desire not nouelties, or to bring in innouations, but I propound these things vpon good grounds and examples of the best Bathes in Europe, and so I desire to haue them considered of, referring both this point, and whatsoever else I haue said in this discourse, to the censure of those who are able to iudge.

De compos. med. s. locos lib. 8. c. 7. I doe purposely omit many things about the vertues and vses of our Bathes, which belong properly to the Physitian, and cannot well be intimated to the Patient without dangerous mistaking. For as *Galen* saith, our Art of Physicke goes vpon two legges, Reason and Experience, and if either of these be defectiue, our Physicke must needs be lame. Reason without Experience, makes a meere contemplatiue and theoricall Physitian: Experience without Reason, makes a meere Empericke, no better then a Nurse or an attendant vpon sicke persons, who is not able out of all the experience he hath, to gather rules for the cure of others. Wherefore they must be both ioyned together: and therefore I referre Physitians workes, vnto Physitians themselues.

FINIS.

Errata.

Page 2. line 19. for 4000. read 40000. page 83. line 13. for 4000. read 400.

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